

Chemical Week

April 19, 1958

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◀ CW Report: Motivation Research. Here's how it can help you, how to use it . . . p. 85

More expansion ahead. McGraw-Hill study also limns sales, research gains . . p. 28

Polaroid's push for a color film spurs breakneck research by other photo film makers . p. 63

Chemical Progress Week gives high school student glimpse of salesman's day p. 78

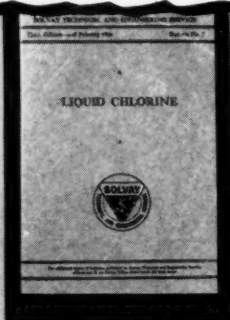
Making new market for metals—zirconium makers set sights on equipment outlets . p. 105

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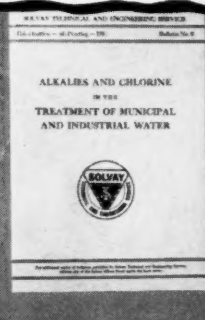
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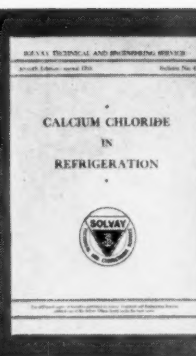
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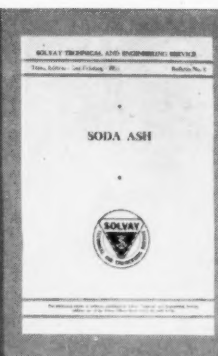
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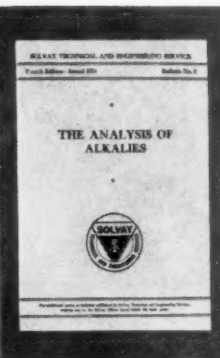
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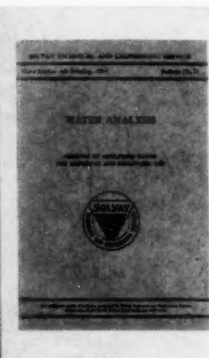
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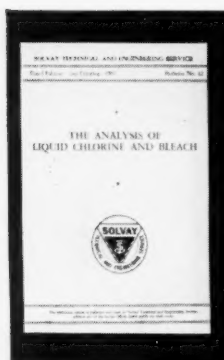
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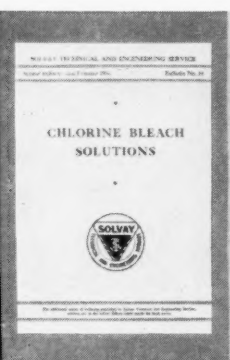
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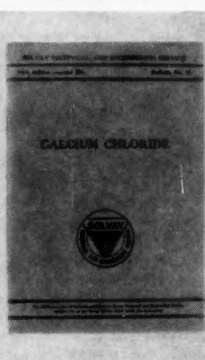
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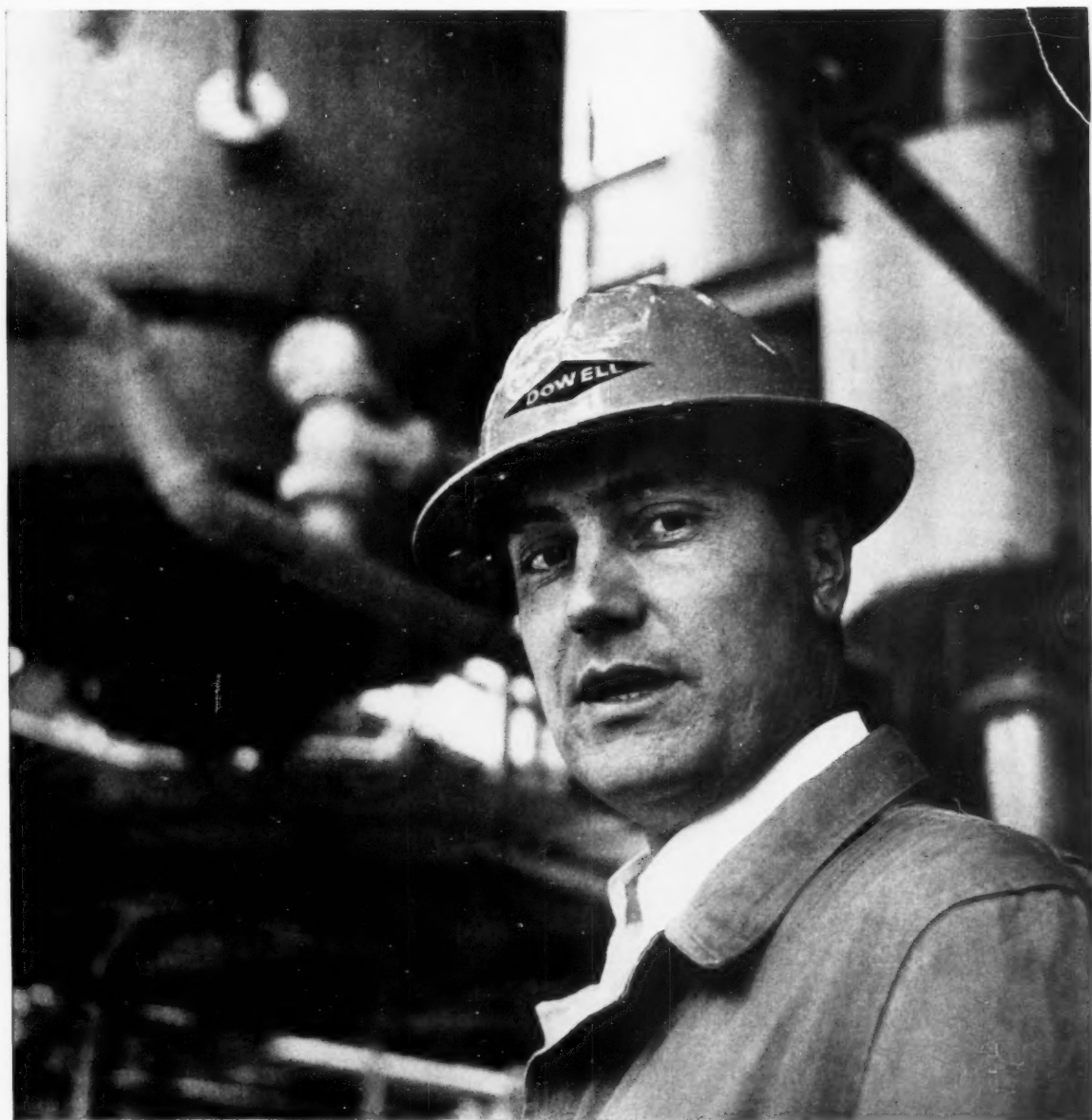
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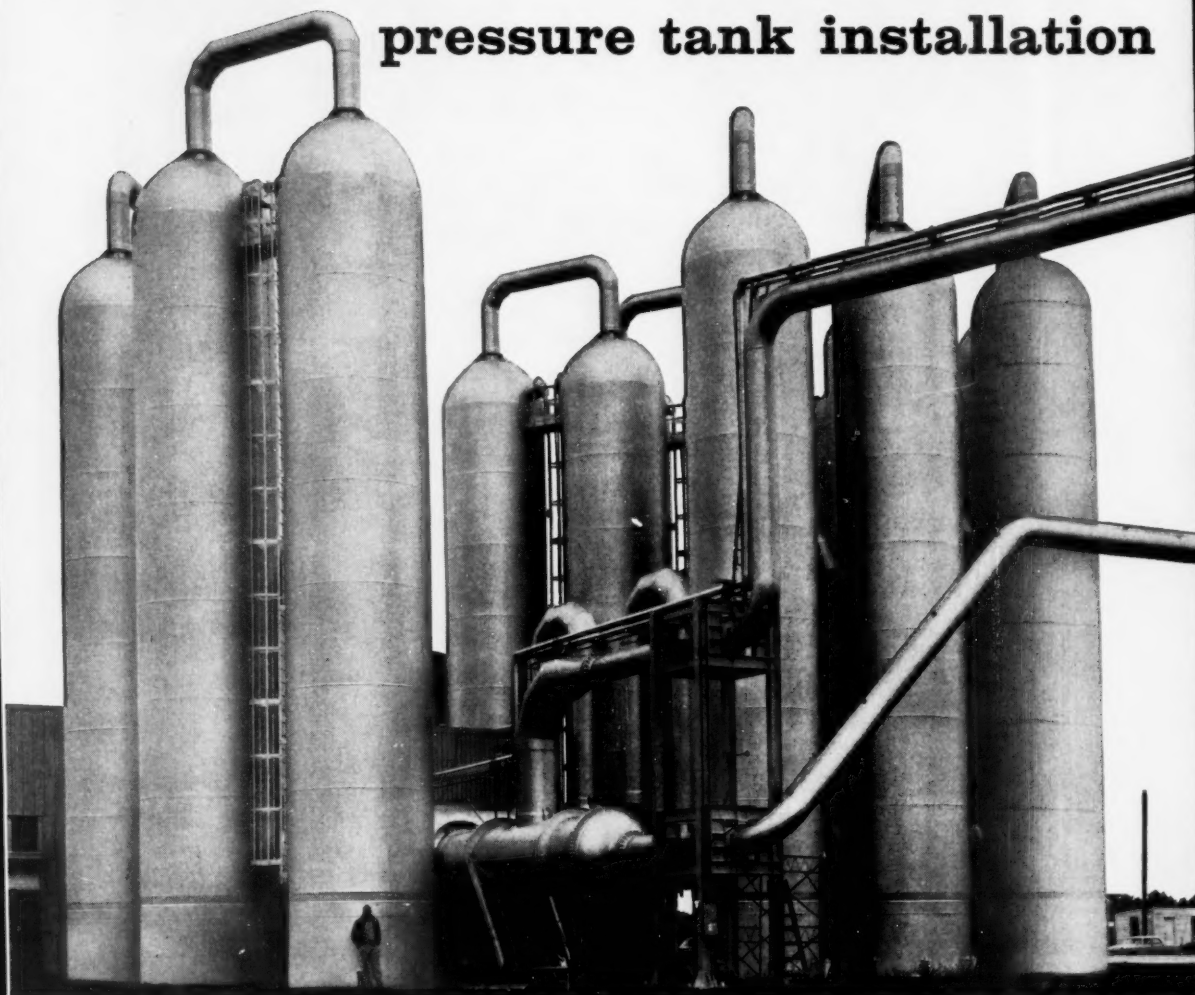
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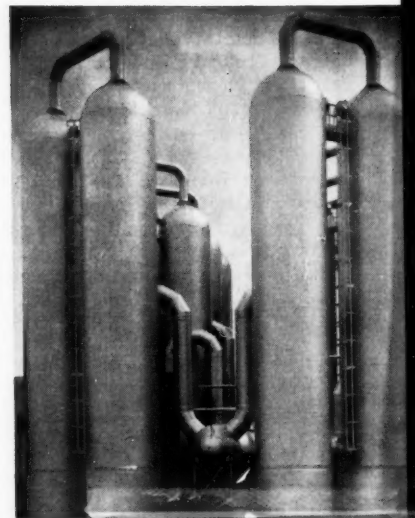
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Chemical Week

TOP OF THE WEEK

APRIL 19, 1958

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Are electrolytic cell users costing themselves money by ignoring basic electrical principles?

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54 New boiler burns cheap "char"; fuel is by-product of coal-chemical recovery.

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Motivation research might increase effectiveness of your marketing effort. Here's how it works.

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Surging demand for synthetic fibers and fiber intermediates boosts hydrogen cyanide demand. Output goal—80,000 tons in '58.

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Zirconium's future hinges on its acceptance in equipment applications. Here's how metal makers will try to enlist CPI support.

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112 CHARTING BUSINESS

New high in margarine output—1.5 billion lbs.—means lush market for chemicals.

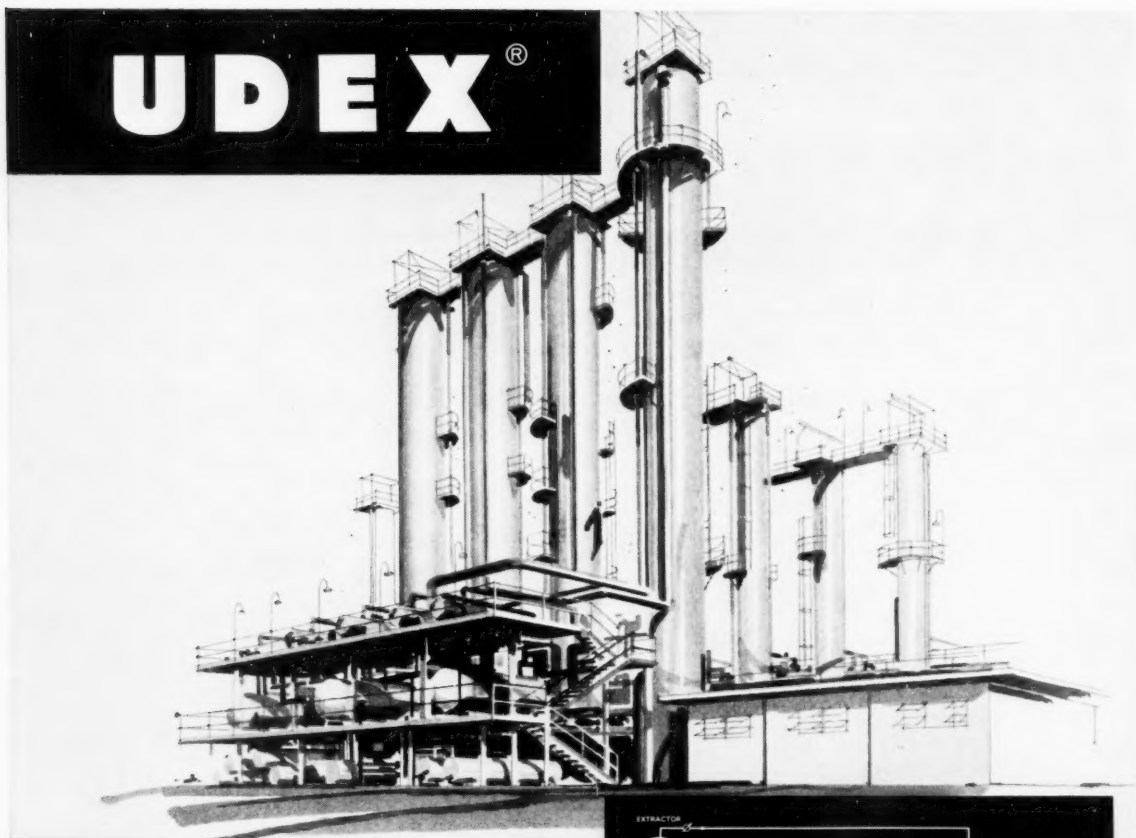
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Vol. 82
No. 16

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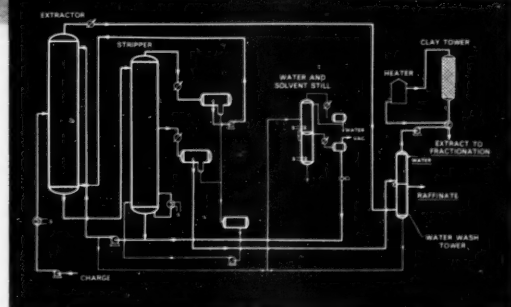
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SPECIAL RESIN GRADE DIOLS

Polypropylene glycols are widely used as major components in polyether systems. Three new grades are available in tank car quantities:

| Product | Molecular Weight | Hydroxyl Number* |
|-------------------------|------------------|------------------|
| NIAx Diol PPG-2025..... | 2025..... | 56 |
| NIAx Diol PPG-1025..... | 1025..... | 110 |
| NIAx Diol PPG-425..... | 425..... | 265 |

The range of molecular weight permits a wide variation in polymer properties. NIAx Diol PPG-2025 is incorporated in cushioning products. NIAx Diol PPG-1025 and NIAx Diol PPG-425 are of value in semi-rigid foams, coatings, and elastomers.

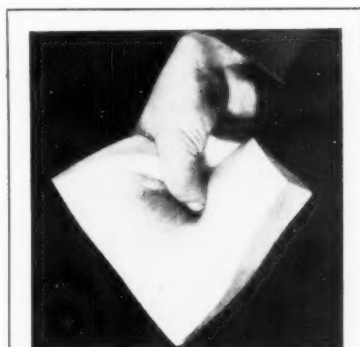
6 TRIOLS IN NEW SERIES

A new series of NIAx polyurethane intermediates are the propylene oxide adducts of trifunctional polyols—

| Product | Hydroxyl Number* | Molecular Weight |
|-------------------------|------------------|------------------|
| NIAx Triol LHT-42..... | 42..... | 4,000 |
| NIAx Triol LG-56..... | 56..... | 3,000 |
| NIAx Triol LHT-67..... | 67..... | 2,500 |
| NIAx Triol LHT-112..... | 112..... | 1,500 |
| NIAx Triol LG-168..... | 168..... | 1,000 |
| NIAx Triol LHT-240..... | 240..... | 700 |

Polyethers with three reactive hydroxyl groups are used to obtain highly cross-linked urethane polymers. In general, as the hydroxyl number of NIAx Triol increases, so does the load-bearing properties of the final foam. NIAx Triol LHT-42 gives a very soft flexible foam, while NIAx Triol LHT-240 is useful in formulating semi-rigid crash pads.

Flexible foams made with NIAx Triol LHT-67, NIAx Triol LG-56, and NIAx Triol LHT-112 show improved compression set characteristics over similar foams based on diols cross-linked with low molecular weight trifunctional or tetrafunctional simple polyols. NIAx Triol LHT-112 and NIAx Triol LG-168 with NIAx Diol PPG-2025 in flexible foam formulations give improved compression-deflection properties with minimum loss in tensile strength or resiliency.



A new field of polymer chemistry has developed through study of the reaction of the isocyanate group with compounds containing active hydrogen atoms. Development of new low-cost polyethers is speeding the commercial use of urethane polymers—from soft resilient foams pictured here to semi-rigid crash pads and tough abrasion resistant elastomers and coatings. The CARBIDE polyethers—through the hydroxyl group—react with aromatic diisocyanates in the presence of amine catalysts to form the stable urethane structure.

Thus, foam properties can be varied over a wide range by use of the NIAx Triols alone or in combination with NIAx Diols.

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able for evaluation. Polyethers containing 10, 25, and 50 per cent polyoxyethylene linkages suggest numerous applications where good low temperature properties and reduced oil solubility are needed. The copolymers containing higher amounts—25 and 50 per cent—of ethylene oxide are suggested for trial in sponges and other products where water absorption is needed.

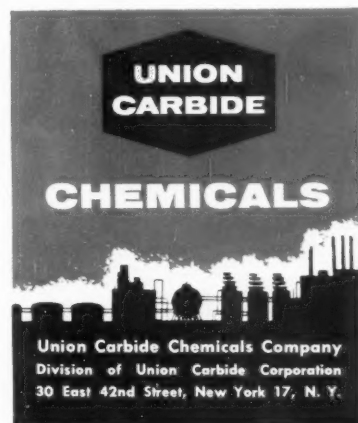
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In Canada, Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal.

*Hydroxyl number represents the number of reactive OH's and is measured by the number of milligrams of KOH required to neutralize one gram of NIAx polyether sample.

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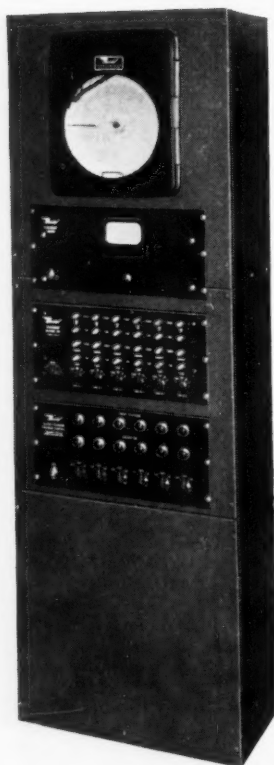


★ Viscosity

★ Specific Gravity



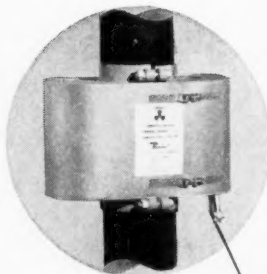
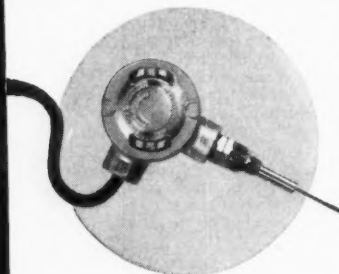
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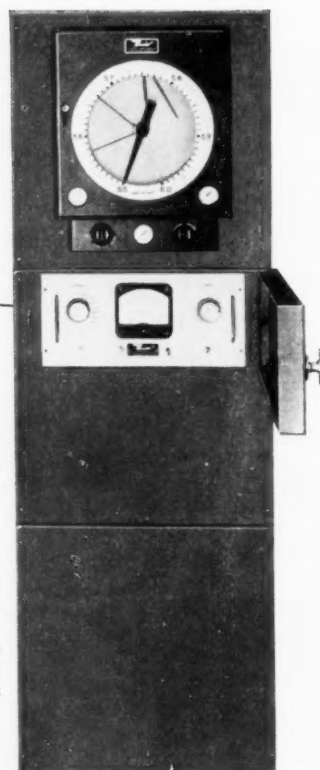
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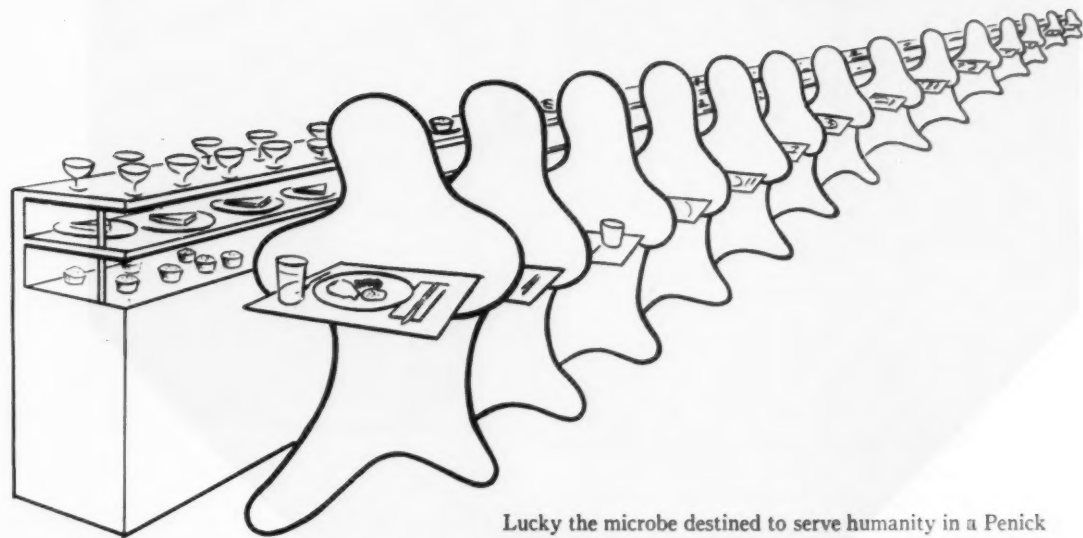
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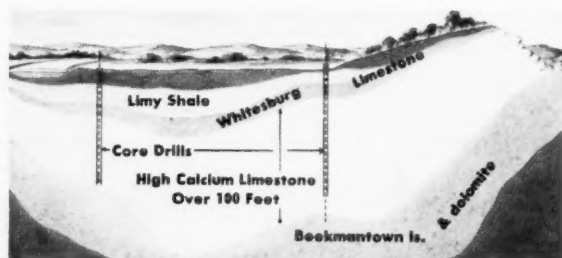


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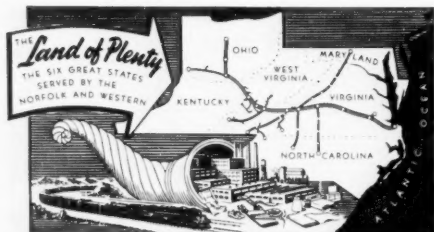
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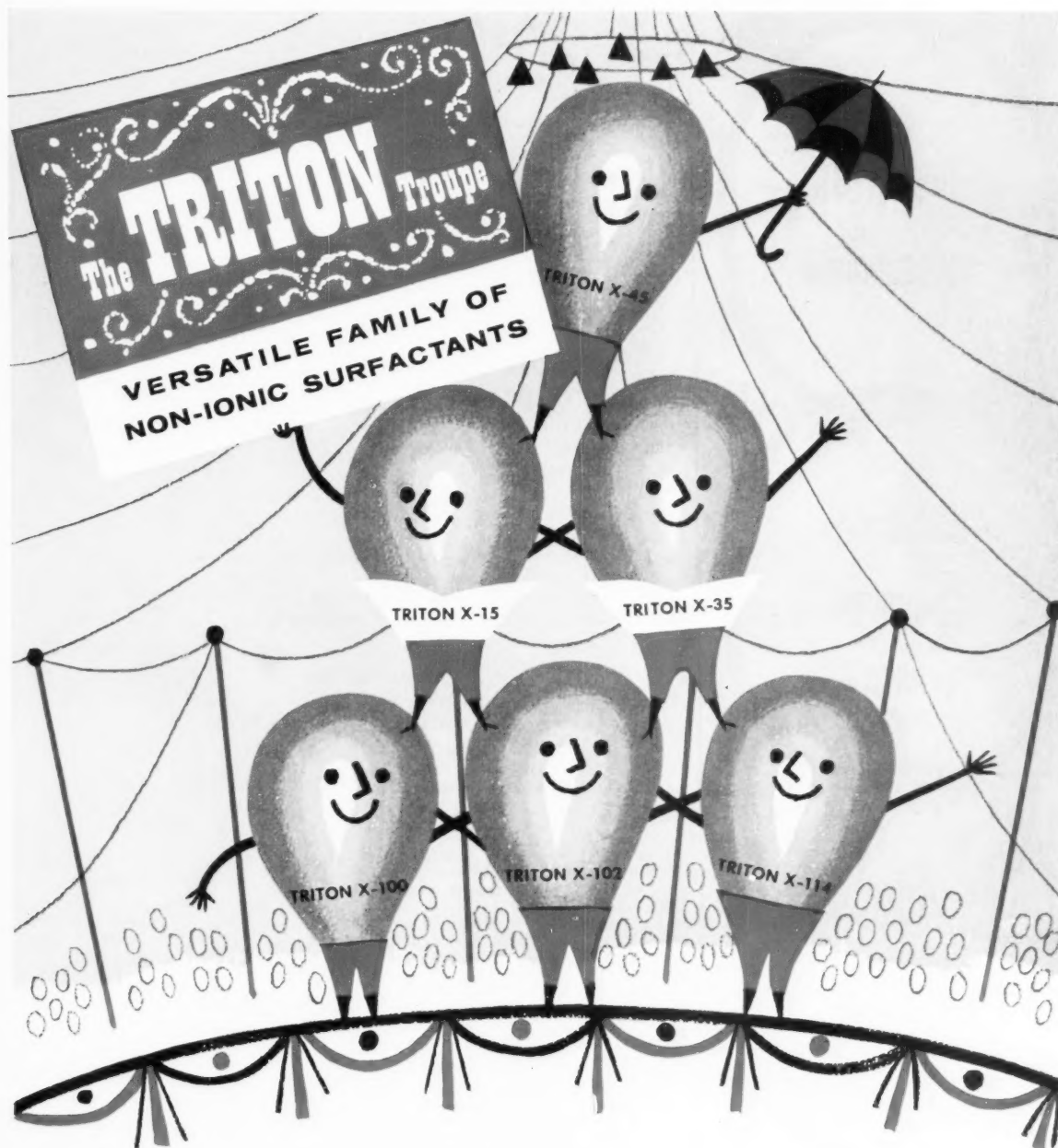
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ready for immediate shipment

Typical breakdown is shown below:

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| ortho-Xylene | 99.2% |
| meta-Xylene | .6% |
| C ₈ Aromatics | .2% |



Now ortho-Xylene of 99.0% minimum purity. Cosden offers immediate delivery of research-specification ortho-Xylene in commercial quantities at commercial prices.

For complete details, write Organic Chemicals Division.



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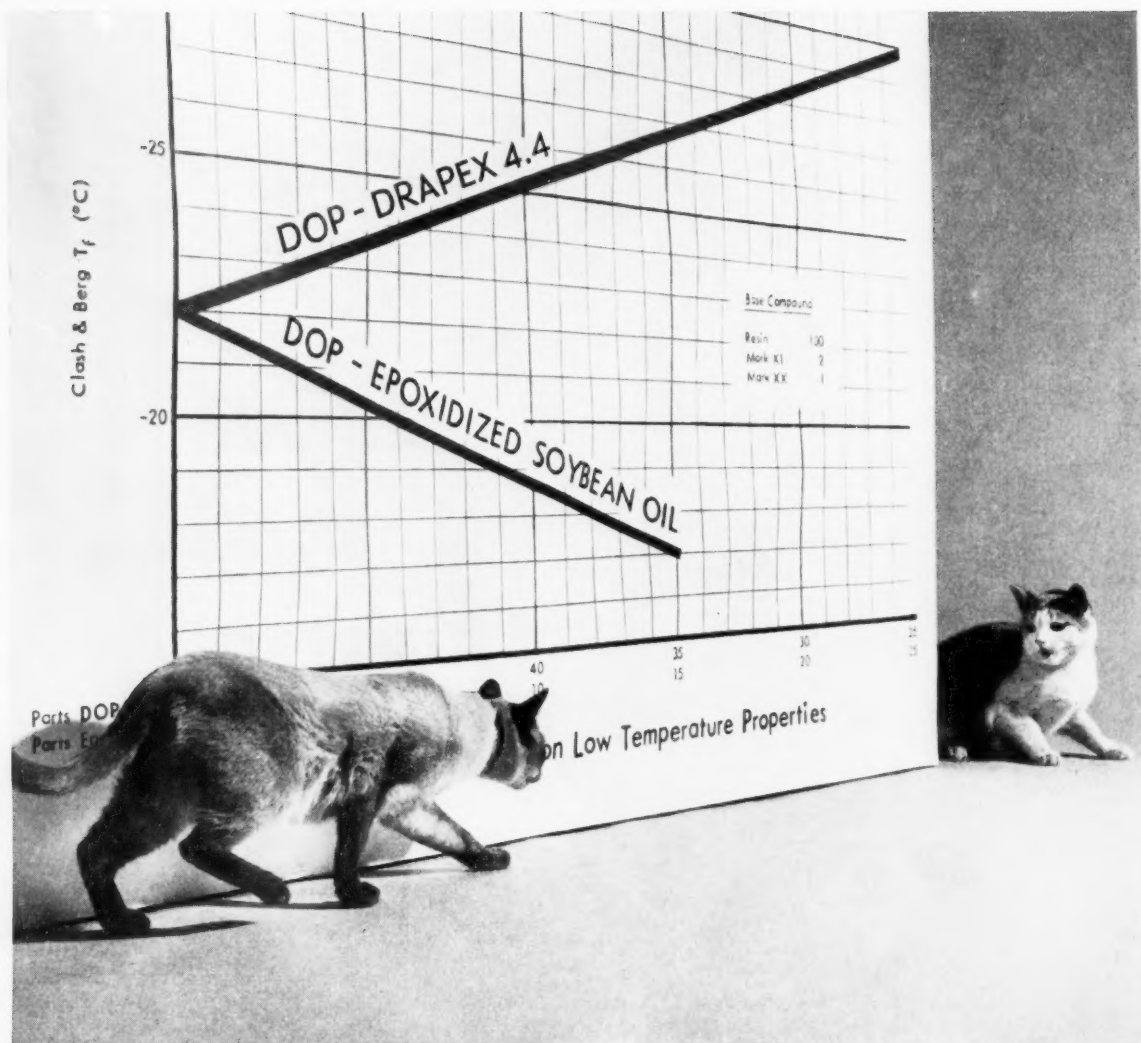


Chart shows comparison between effects of Drapex 4.4 and an epoxidized soybean oil on low temperature properties. Low temperature flexibility is a major advantage of Drapex 4.4.

PURE-BRED EPOXY... AT AN ALLEY-CAT PRICE!

There's a blue-ribbon champion in epoxy plasticizers — Argus' Drapex 4.4! At its new, reduced price, you can replace ordinary epoxy plasticizers with Drapex 4.4 in your vinyl formulations, with the following important advantages:

1. Low temperature flexibility (see chart above).
2. Low volatility.
3. Improved heat and light stability.
4. Low viscosity and viscosity stability in plastisols.

5. Ease of handling (due to low viscosity and low freezing point).
6. Good weatherability.

Argus research has steadily widened the applications of Drapex 4.4 until it now actually costs *less* than other quality epoxies. Moreover, the lower specific gravity of Drapex 4.4 makes it go farther, so that in volume use it costs less than the cheapest competitive epoxy.

For complete information on Drapex 4.4 (and its sister product, Drapex 3.2), write for Technical Bulletin #3.



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CORPORATION

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Main Office: 633 Court Street, Brooklyn 31, N. Y.

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Rep's.: H. M. Royal, Inc., 4814 Loma Vista Ave., Los Angeles; Philipp Bros. Chemicals, Inc., 10 High St., Boston; H. L. Blachford, Ltd., 977 Aqueduct St., Montreal.

Now! One-pipe steam-traced systems

with new
Reynolds Aluminum Duplex Pipe
with steam line built-in.

Now a complete steam-traced system can be installed in one pipe: Reynolds new Aluminum Duplex Pipe.

This tough, lightweight pipe has a *built-in* steam line... it eliminates the need for steam jacketing... it eliminates outside steam-trace lines... it permits use of standard insulation... it's a complete steam-trace system in one pipe.

Installation is fast and simple, too, with Reynolds Duplex Pipe. It's lightweight and easy to handle, join and weld, and can be formed readily with ordinary hydraulic pipe bending equipment.

The new Reynolds Duplex Pipe can improve heating efficiency, and reduce the need for insulation. Aluminum has high thermal conductivity, low emissivity. This means better heat transfer within the Duplex Pipe, less heat lost, less insulation needed.

And, like the Reynolds Aluminum Process Pipe that is handling the roughest jobs in the chemical processing and petroleum industry, the new Duplex Pipe stands up against corrosion.

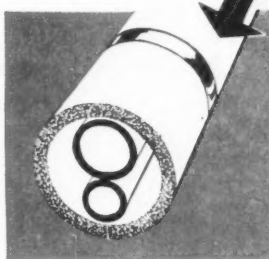
Reynolds Duplex Pipe is available in four sizes—1½", 2", 3" and 4"—and in alloys 3003-F, and 6063-T5.



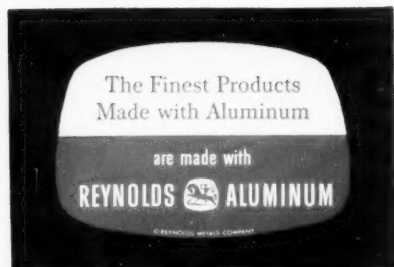
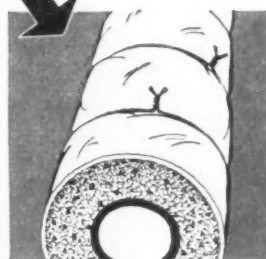
THIS ELIMINATES

THESE UNNECESSARY COSTS:

...the cost of steam jacketing
and extra pipe



...the cost of excessive
insulation

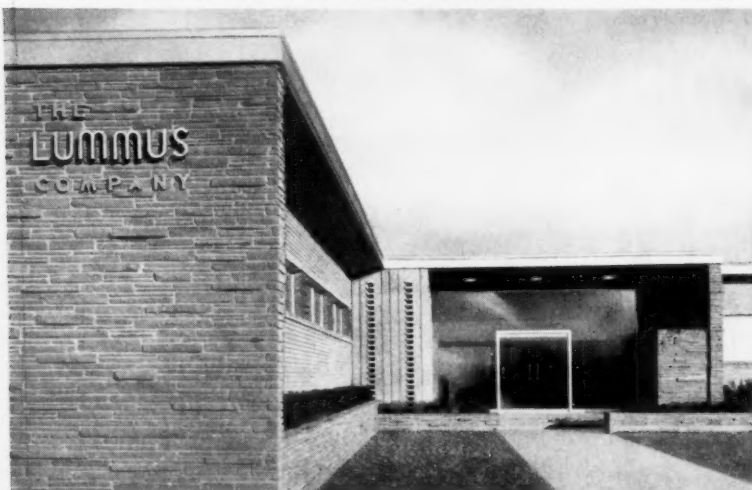


Get full information on
Reynolds Duplex Pipe

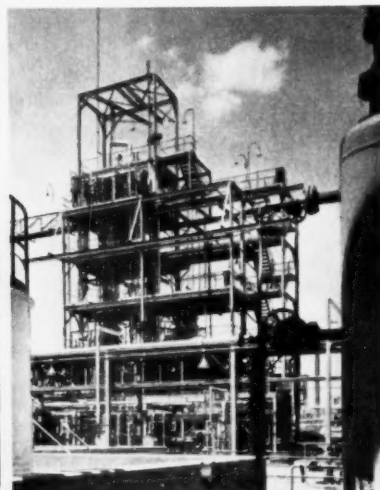
FREE BROCHURE

Write today for a free brochure on Reynolds Aluminum Duplex Pipe, for details on joining, sizes, alloys and pressure ratings. Reynolds Metals Company, P. O. Box 1800-CM, Louisville 1, Kentucky; International Division, 19 East 47th Street, New York 17, New York.

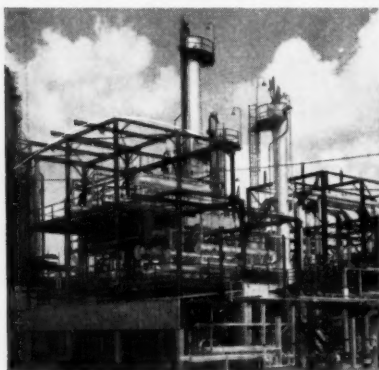
Watch Reynolds All-Family Television Program, "DISNEYLAND", ABC-TV.



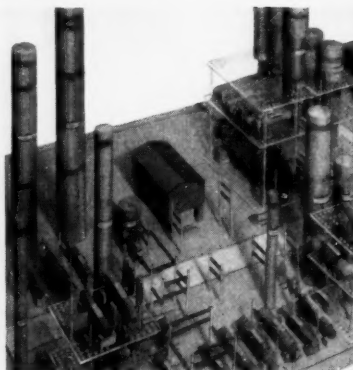
This modern building houses Lummus Houston.



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First ultraforming unit in the U. S.



\$11 million ethylene oxide plant.



Complete refinery.

Lummus Houston serves the Southwest's process industries

Staffed by over 300 specialists—this office is completely integrated for design, engineering and construction for the constantly expanding Southwest

The Lummus Houston office, like all Lummus engineering offices and subsidiaries throughout the world, can design, engineer, procure and construct any size or type plant for the process industries.

Lummus Houston, established in 1939, has to its credit scores of the more than 700 Lummus petroleum, petrochemical, and chemical projects completed throughout the world in the last half century.

Recent Lummus Houston projects, pictured above, include the first Ultraforming Unit in the United States, a Bisphenol-A plant extension with additional facilities for the manufacture of EPON Resins, an \$11 million Ethylene Oxide Plant, and a complete refinery which has oper-

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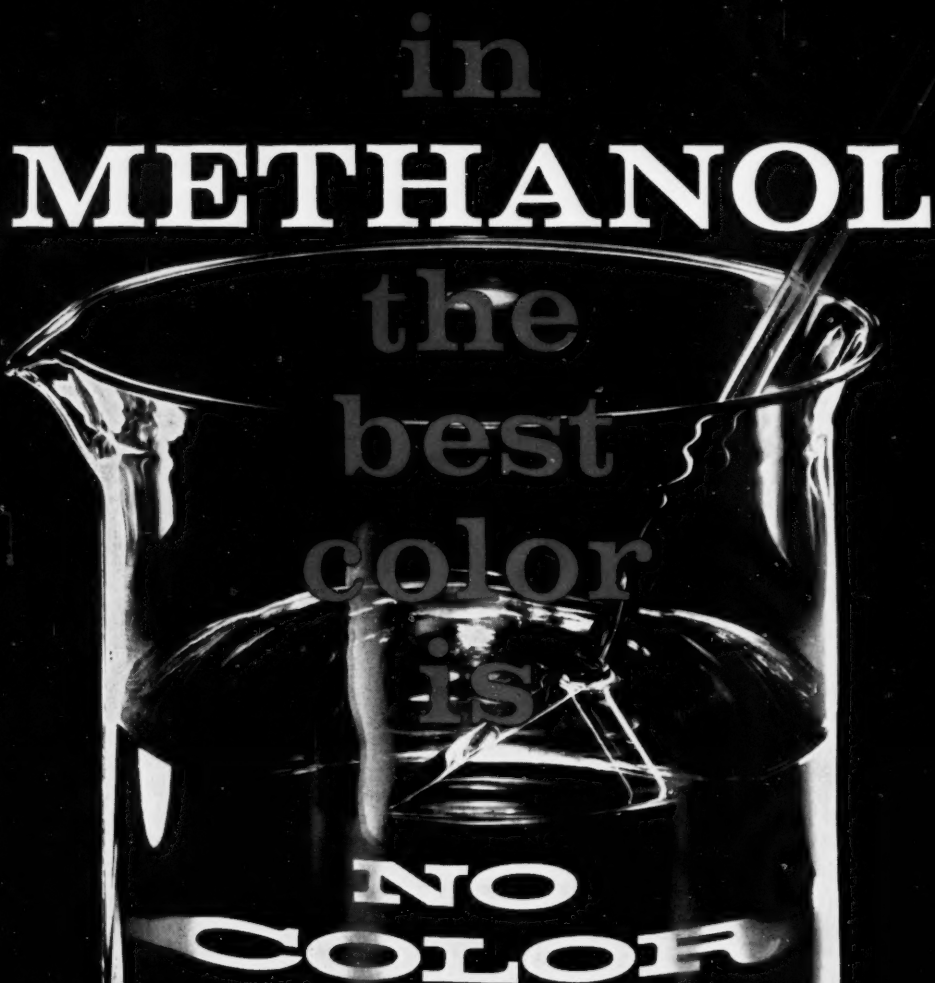
and refining, its resources for large volume production of quality materials and its dependability of deliveries and service. Call today for information about Potassium Chloride, Caustic Potash, Carbonate of Potash, Magnesium Oxide, Muriatic Acid and other *International Chemicals for Industry*.

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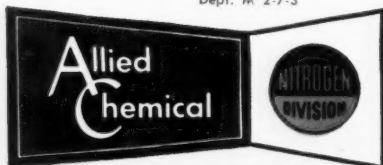
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Business Newsletter

CHEMICAL WEEK

April 19, 1958

Recession doesn't necessarily call for retrenchment. That's the apparent lesson of recent acquisitions and new ventures on the way.

- Du Pont, which hasn't made an acquisition since 1945, is considering purchase of 85% of the capital stock of Cornwell Chemical Corp. (Cornwell Heights, Pa.). Cornwell—headed by Mark Bradley, former general manager of Allied Chemical's General Chemical Division—produces sulfuric acid for various industries along the Delaware River in the Philadelphia-Camden-Bristol area. It does an annual business of about \$1.5 million. Du Pont has two plants at Philadelphia, including a Grasselli Chemicals Dept. plant, but no sulfuric acid unit there.

- Stauffer Chemical, which also is considering a small acquisition (*see p. 31*), is exploring possibilities for a new petrochemical operation in partnership with Richfield Oil Corp. (Watson, Calif.). These two companies set up American Chemical Corp. five years ago as a jointly owned subsidiary to bid on the government-owned Los Angeles styrene plant, which finally went to Shell. Stauffer and Richfield then studied various ideas for petrochemical projects—such as chlorinated hydrocarbons—that would involve profitable upgrading of refinery products. Several proposals are now undergoing process and market investigations, and it's possible that the parent companies might reach a go-ahead decision as early as this summer.

- Polymer Corp. (Reading, Pa.) has purchased all outstanding capital stock of Halex Corp. (Detroit). Halex has been developing pressed and sintered parts made from Nylasint, the processed nylon powders developed by Polymer Corp.

- Bee Chemical Co. (Chicago) has absorbed through merger Logo, Inc., formerly its wholly owned subsidiary, and is planning to increase research and development work in the fields of specialty coatings for plastics and vacuum-metallizing.

- Ladish Pacific Co. (Los Angeles)—division of Ladish Co. (Cudahy, Wis.), maker of pipe fittings, flanges, drop forgings, valves and pumps—reportedly has just bought controlling interest in Oregon Metal-lurgical Co. (Albany, Ore.). The latter firm makes cast titanium equipment.

- The Borden Co.—which recently bolstered its chemical division (*CW, Jan. 25, p. 32*)—has now acquired Marcelle Cosmetics, Inc. (Chicago), to broaden the line of its pharmaceutical division. Marcelle is one of the leaders in manufacture of hypo-allergenic cosmetics (*CW, Sept. 7, '57, p. 95*).

•

Troubles for U.S. process firms in Cuba last week underscore the importance of political factors in foreign investment plans. In revolution-saturated Santiago, an explosion demolished the warehouse of Cuban Air Products Co., subsidiary of Air Reduction Co. At Mariel (near Havana), operations at the U.S.-owned Morro cement plant were suspended when

Business Newsletter

(Continued)

rebels cut power lines and damaged four oil pumps. Fidel Castro's unsuccessful general strike succeeded in shutting down the big Texas Co. refinery. Allied Chemical reports that chemical shipments from its affiliate companies at Sagua la Grande have reached a standstill. And rebel activity near Moa Bay caused construction workers to stay away from their jobs on Freeport Sulphur's Cuban-American nickel and cobalt project.

•
More companies are filling in the pattern of first quarter earnings this week.

- Celanese Corp. President Harold Blancke predicts a 4% sales boost to \$48.9 million, but expects profits to be "a little lower" because of price cuts of yarn since the beginning of the year. Biggest sales gains are in textiles and plastics. Chemicals, which normally account for 18% of sales, are lagging.

- Union Carbide estimates first-quarter sales will be \$293 million, down 16%. Earnings will be even further off, perhaps as much as 41%. The company pinpoints slow demand for ferroalloys and electric furnace electrodes in the steel industry as chief reasons for the decline. Later this year, however, Carbide expects earnings to improve.

- General Aniline & Film President John Hilldring told stockholders that first-quarter sales were off 1%, to \$32.1 million, and that earnings fell 6%, to about \$0.9 million. Hilldring expects an earnings increase later this year from a new microfilming process now being perfected by the company's Ozalid Division.

- Cutter Laboratories, benefiting from a booming market in pharmaceuticals, reports first-quarter sales up 12.6%, to \$4.2 million; earnings hit \$132,000, more than double last year's three-month total.

- Hercules' first-quarter sales and operating revenues amounted to \$56.8 million, off 6.7% from the first three months of 1957. Per share earnings were 38¢, compared with 48¢ for last year's first quarter.

•
Things are looking up in the nylon business. Chemstrand plans to recall 600 more workers at its Pensacola, Fla., plant by the end of this week, bringing the work force back to normal following 1,000 layoffs during February and March. Reason: nylon orders so far in April have already topped the total for all of March—and are still on the upswing.

Du Pont, too, reports that March nylon orders were 10% ahead of February and are "continuing to improve."

•
Last weekend's scare over iproniazid—based on reports of the deaths of one woman in San Francisco and another in New York who had been taking the energizing drug—led to a speedup in removing from retail drug stores all containers bearing labels recommending a dosage of 150 mg./day. With FDA approval, the maker—Hoffmann-Larroche (Nutley, N. J.)—replacing them with packages whose labels call for dosages of up to 50 mg./day.

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You put pride in your product...so does FROSTKRAFT.
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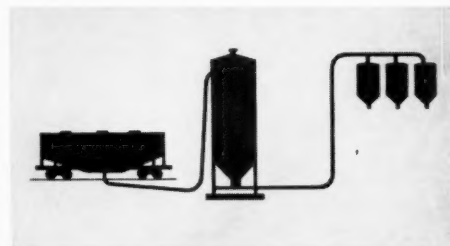


GOT TONS OF RESINS AND PLASTICS TO MOVE? FULLER will do it better with air

Fuller offers you over 30 years of experience in designing and building pneumatic conveying systems for dry bulk materials . . . Fuller-Kinyon, Fuller-Fluxo, Airveyor[®] and F-H Airslide[®].

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You too will find, as thousands of others have, that it is good economy to install Fuller pneumatic conveying systems for top sustained production at lowest operating costs. It will permit you to take full advantage of savings inherent in handling materials in bulk.



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...but still in there,
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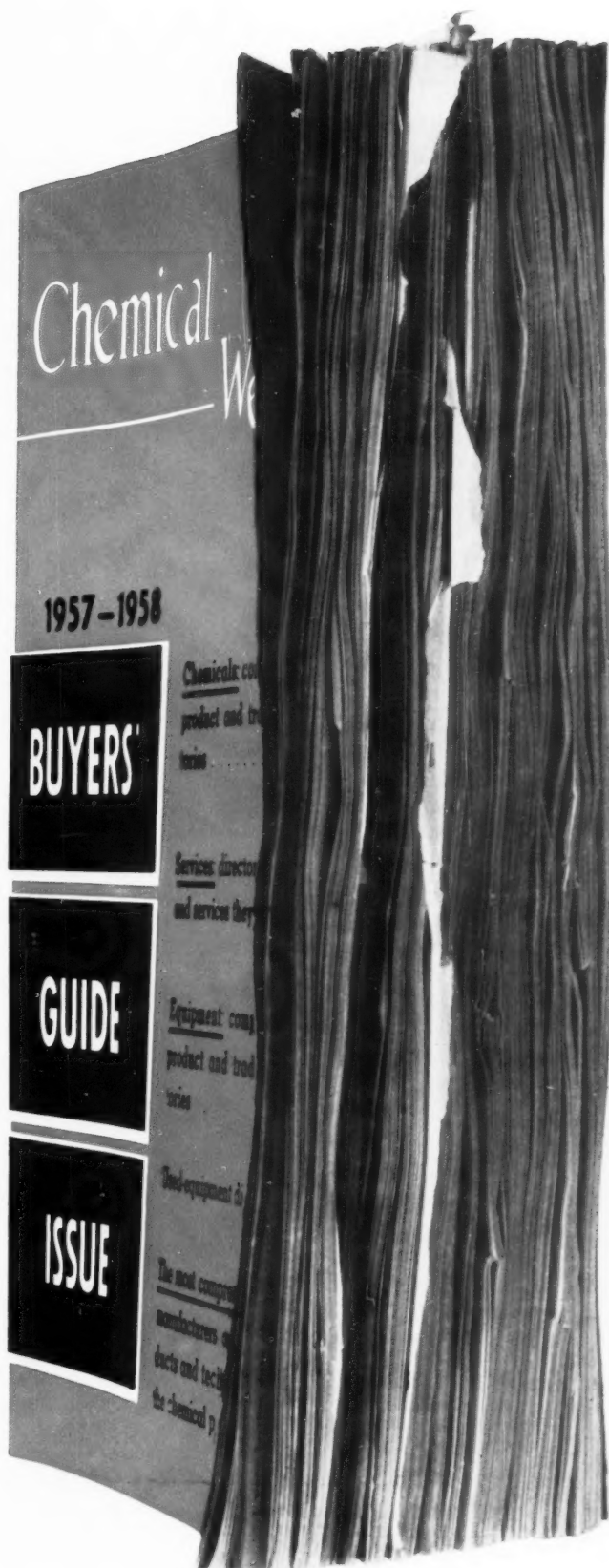
Why such affection? Because it's so down-right dependable...actually 12 directories-in-one...over 7,000 product listings...over 400 bread-and-butter, highly serviceable advertising pages. CPI buyers use it more because it gives them so much more — 74 percent of those CW BUYERS' GUIDE users prefer it over any other catalog or directory.

One missing ingredient — who are these men? Some so-called selectively picked distribution list? Ah, no — they're the paid subscribers of Chemical Week, itself...over 40,000 (for the '58 edition) "management men in all functions"...men who have the power to buy after they know *what* and *where* to buy.

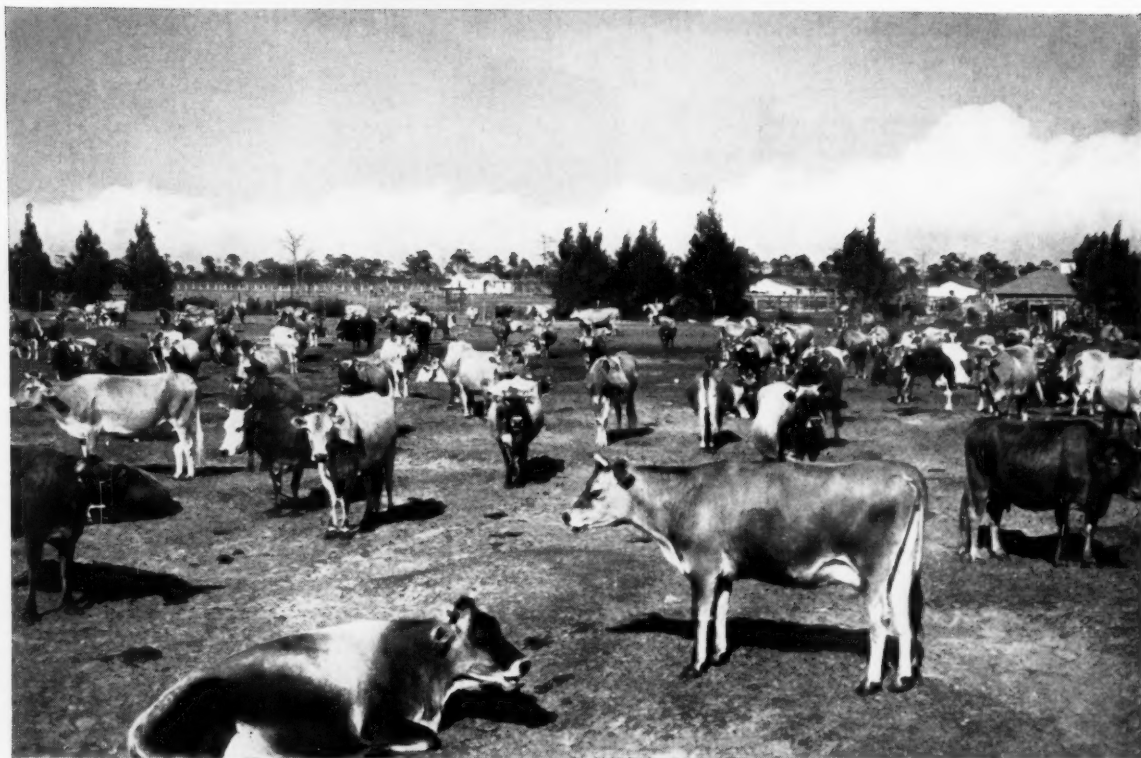
And that's why you should buy all the advertising pages that make sense for your needs in the 1958-'59 BUYERS' GUIDE. *Reserve your space today!*

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INSERT CLOSING... AUGUST 1

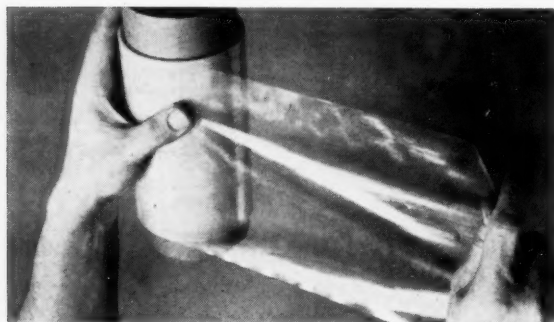
CHEMICAL WEEK BUYERS' GUIDE



HOW *HERCULES* HELPS...



KEEP COWS CONTENTED—A number of Hercules ingredients contribute toward healthy, more productive livestock. Dalpac® BHT, for example, is a high quality feed antioxidant that promotes full assimilation of essential nutrients and protects vitamin potency. Hercules para-cresol is the basis for intermediates used in the production of growth stimulants and other pharmaceutical chemicals. Sprays based on Thanite® protect animals from annoying and often harmful insect pests.



PIONEER NEW PRODUCTS—Pro-fax®, Hercules' new polypropylene, makes transparent film with exceptional resistance to chemicals, oils, greases, and will withstand heats to 300° F. Rigid enough for use in overwrap machines, new Pro-fax films have excellent impact and tear strength and can be heat-sealed with conventional equipment.



UPGRADE FOOD FLAVORS—Monosodium glutamate from the Huron Division of Hercules is being used by an ever increasing number of food packers to enhance the quality of their products. MSG increases taste appeal—and sales—of a wide variety of processed foods.

*Hercules trademark

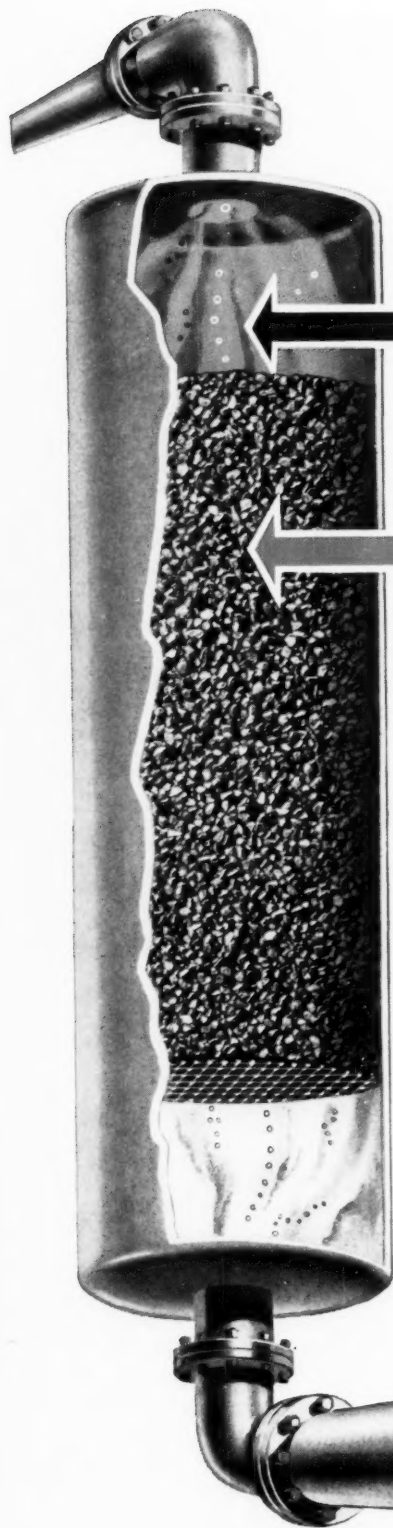


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900 Market Street, Wilmington 99, Delaware

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HERCULES



Assure Highest Product Quality in Your Liquid Phase Adsorption

Specify Pittsburgh Granular Carbon

If your job is to increase efficiency, reduce costs and produce higher product quality in a liquid phase adsorption process, then you'll want to know *more* about the unique benefits of using PITTSBURGH Granular Activated Carbons in a fixed bed column system. Just look at these specific advantages over "batch-type" operations with powdered activated carbons:

1. Greater capacity, lower carbon dosage, lower cost. In effect, you achieve the efficiency of an infinite series of batch-type treatments.
2. Higher product quality, better colors, higher purity.
3. Cleaner operation, no slurring or dusting problems.
4. Less equipment and maintenance—the ultimate in simplicity of operation.

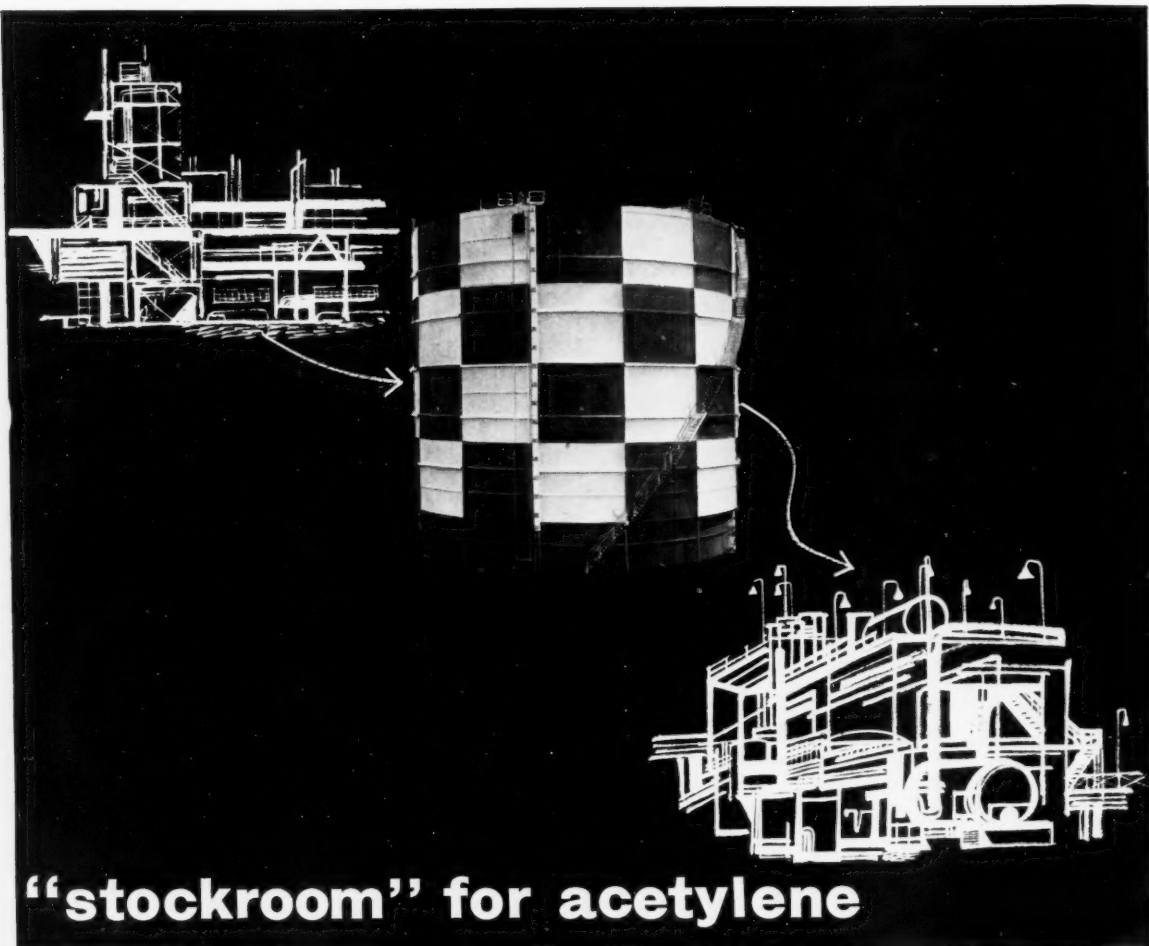
What's *your* liquid phase adsorption problem? Decolorizing a solution? Refining a food product? Purifying a pharmaceutical? *Pittsburgh coal-derived Activated Carbons, used in a column system, will do a better job at lower cost. And we have the facts to prove it!*

You'll find there's a type of PITTSBURGH Granular Carbon ideally suited to solve your particular adsorption problem. *Write today for your free copy of information brochure on adsorption with activated carbons.*



WSW 7158

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“stockroom” for acetylene

**Linde Company* purchases Wiggins Gasholder
for storage of acetylene
between production and use cycles**

Ever since the Linde Company's new acetylene plant in Montague, Michigan went “on stream”, a new 100,000-cubic-foot Wiggins Gasholder has played a vital role in the operation. Every cubic foot of acetylene produced passes through the “stockroom” on its way to DuPont for use in the production of Neoprene. The gasholder provides acetylene storage and serves as surge capacity to enable Linde to satisfy both normal and emergency requirements.

If you produce, store or use gases, investigate the advantages of Wiggins Gasholders. They can be built to any capacity—from 50-cubic-feet to a million. Call or write General American for complete information.

*DIVISION OF UNION CARBIDE CORPORATION



GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South La Salle Street, Chicago 90, Illinois.
Offices in Principal Cities

OPINION

Operator Training

TO THE EDITOR: . . . [Re the] article (Feb. 8) on our activities. . . . We wish to express our appreciation Pioneers of new ideas have a difficult task of conveying their concept to operational people. This has been done extremely well by your staff. Needless to say, we have become boosters for CHEMICAL WEEK among our many friends in the chemical industry. . . .

E. O. CARMODY
President
Carmody Corp.
Buffalo, N.Y.

Certified Food Colors

TO THE EDITOR: I thought you would be interested to know that the article on certified colors (March 8, p. 71) . . . was found to be of great interest and really worthwhile by a number of my associates and myself.

We were particularly impressed, among other things, with the statistics given concerning the manufacture and sale of certified colors in dollar volume as well as pound quantity. This angle is particularly worthwhile because it clarifies for many consumers of certified colors the amount of such colors used in the United States.

VICTOR G. FOURMAN
President
Syntomatic Corp.
New York

MEETINGS

Scientific Apparatus Makers Assn.; 40th annual meeting, El Mirador Hotel, Palm Springs, Calif., April 20-24.

American Oil Chemists' Society, annual meeting, Peabody Hotel, Memphis, Tenn., April 21-23.

Metal Powder Assn.; 14th annual meeting; production techniques, and applications and properties of powder metallurgy parts; Sheraton Hotel, Philadelphia, Pa., April 21-23.

American Industrial Hygiene Assn., 19th annual meeting, Claridge Hotel, Atlantic City, April 21-26.

Electrochemical Society, five-day meeting, Hotel Statler, New York, April 27.

Manufacturing Chemists' Assn.; conference: 1958 Precautionary Labeling; Shamrock Hotel, Houston, April 30.

April 19, 1958 • Chemical Week



Orange, Texas plant, The Firestone Tire & Rubber Company

How to keep a solvent extraction train highballing

In this butadiene solvent-extraction train, mechanical mixers were needed to provide intimate contact between the solvent and hydrocarbon phases for quick and complete recovery of butadiene.

But where was a proved mixer design that would keep running for years—without frequent stoppages for repacking, or costly dismantling in case of a shaft seal failure?

The answer is in the LIGHTNIN Mixers you see here.

These LIGHTNINs never have to be repacked. Each is equipped with a mechanical shaft seal that positively prevents leakage—and runs, not for months, but for years without ever needing adjustment.

New shaft seal—in a hurry

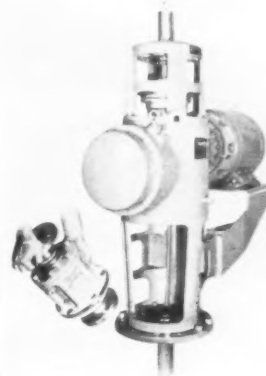
Best of all, seal replacement is a fast, simple, one-man job. When a seal eventually does wear out, there's no need to dismantle the mixer or take it off the tank. The seal cartridge uncouples and comes out in one piece, and a new cartridge is bolted in place, without disturbing shaft alignment.

If you're mixing corrosive chemicals under pressure or vacuum, you may save many thousands of maintenance dollars by specifying Series "E" LIGHTNIN Mixers with these quick-change mechanical seals.

Results guaranteed

You can get LIGHTNINs in hundreds of power-speed combinations, for tanks of any size or shape. Performance is unconditionally guaranteed.

For the full story, call in your LIGHTNIN representative. He's listed in Chemical Engineering Catalog. Or write us direct.



CARTRIDGE SEAL runs for years without any adjustment . . . and uncouples for rapid replacement.

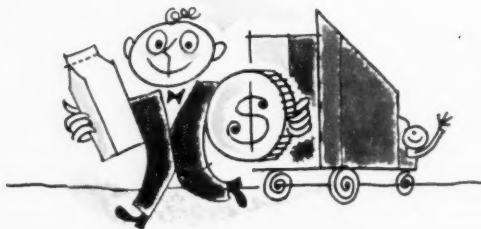
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Blockson service meets the chemical buyer's two basic needs:

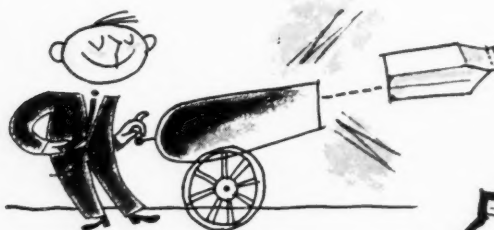
1



■ A ROUTINE METHOD OF BUYING IN ECONOMICAL QUANTITIES

Blockson meets your routine needs with thrifty mixed car, mixed truck service. The saving on each chemical (carload rate) is always important. So is the advantage of acquiring so many phosphates and other chemicals with one phone call.

2



■ A RUSH SERVICE FOR PRODUCTION PEAKS

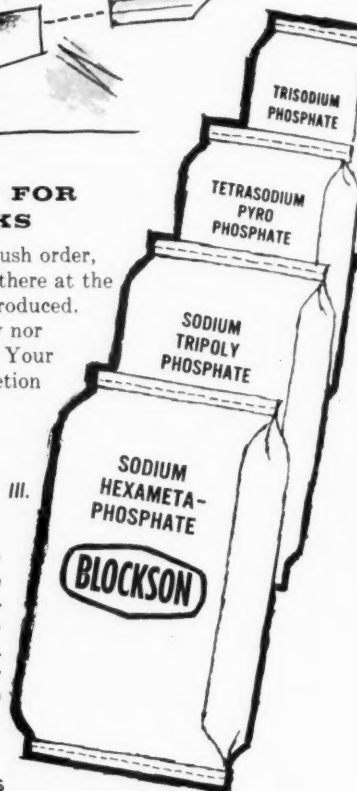
When you call Blockson for a rush order, the man you talk with is right there at the plant where the chemicals are produced. There is no plant-to-plant relay nor branch-to-home office time lag. Your order speeds its ways to completion as soon as you hang up.

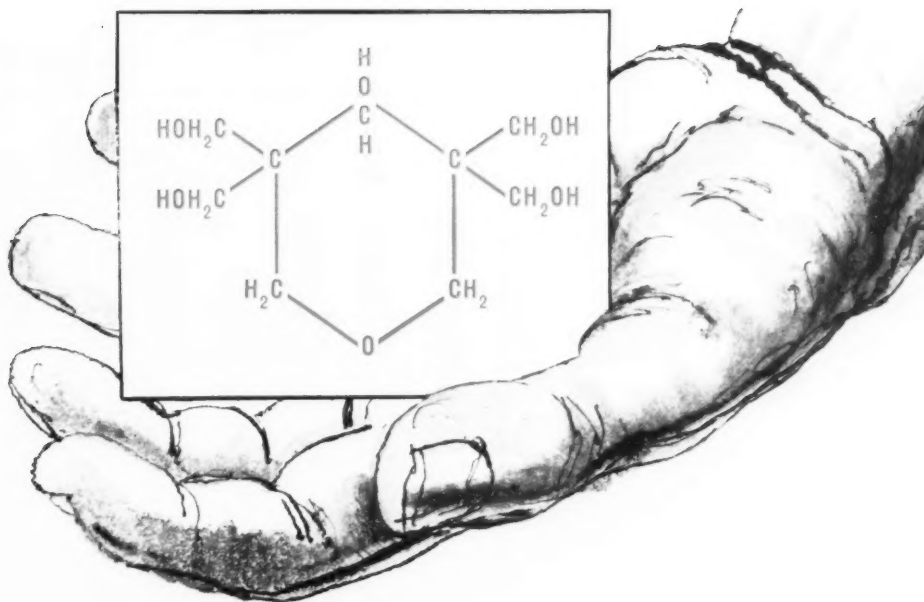
BLOCKSON CHEMICAL COMPANY Joliet, Ill.
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Trisodium Phosphate (Crystalline-Monohydrate) • Trisodium
Phosphate Chlorinated • Disodium Phosphate (Crystalline-
Anhydrous) • Monosodium Phosphate (Anhydrous-Mono-
hydrate) • Sodium Polyphos (Sodium Hexametaphosphate,
Sodium Tetraphosphate) • Sodium Acid Pyrophosphate •
Tetrapotassium Pyrophosphate • Sodium Fluoride • Sodium
Silicofluoride • C-29 Sequestering Agent • Teox 120
(Nonionic Surfactant) • Hydrofluoric Acid • Sulfuric Acid

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Developed by Celanese research and produced by aldol con-

densation process, anhydroenneaheptitol is currently available in experimental quantities in aqueous solution. Evaluate this new Celanese intermediate yourself... find out how it can contribute to lower cost and higher quality in your formulations. Celanese Corporation of America, Chemical Division, Dept. 752-D, 180 Madison Avenue, New York 16, N. Y.

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Celanese® AEH®

AEH...a new

Celanese
CHEMICALS

development

Physical Properties

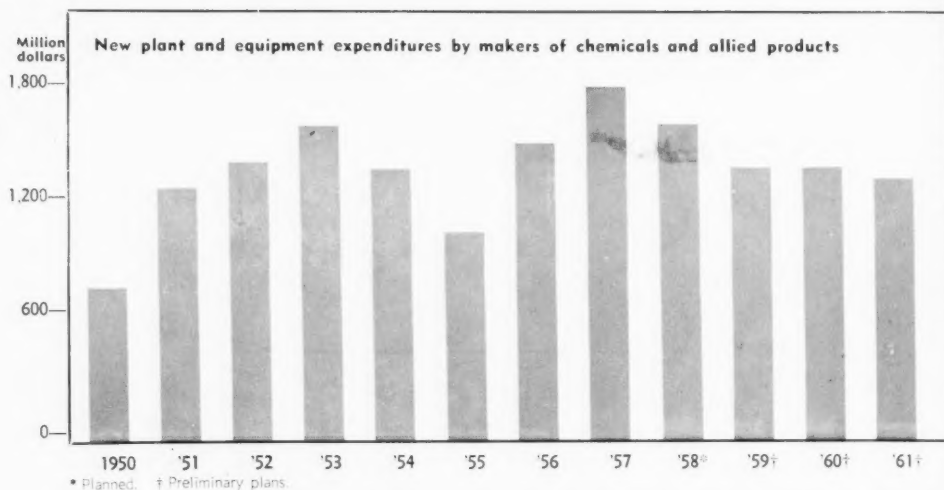
| | |
|---|---------|
| Molecular weight (calculated)..... | 222.1 |
| Hydroxyl content, % (theoretical) | 38.3 |
| Combining weight, based on 5 available hydroxyls (calculated) | 44.4 |
| Melting point, range, °C | 138-139 |

Descriptive Data

| | |
|--|-------|
| Water content, % by wt..... | 28-30 |
| Hydroxyl content, wt. %, min. (corrected for H ₂ O) | 35.0 |
| Color, max., Gardner..... | 5.0 |

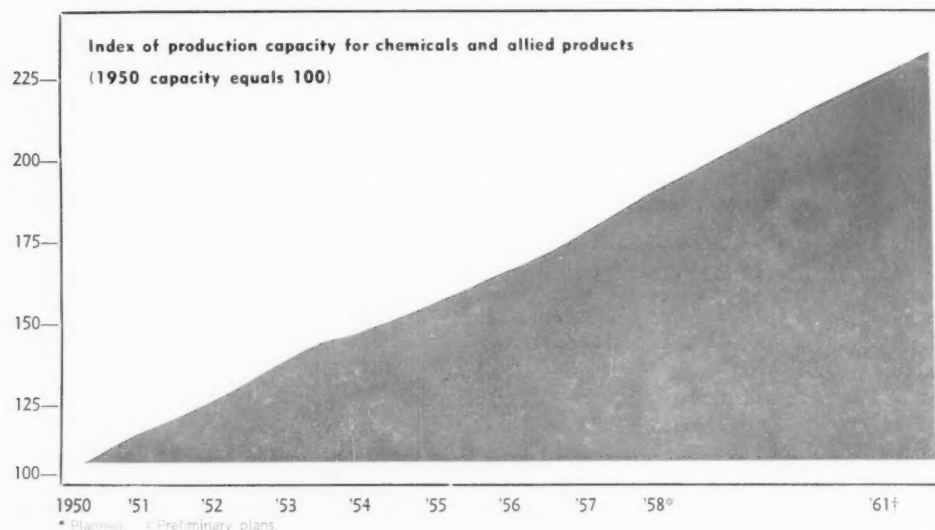
CAPITAL SPENDING

Tapering off from 1957's peak



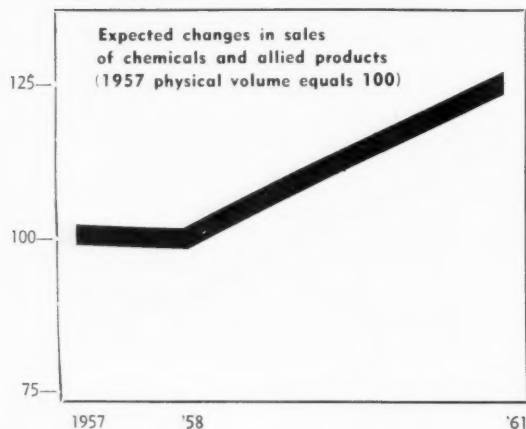
PRODUCTION CAPACITY

27% increase in next three years



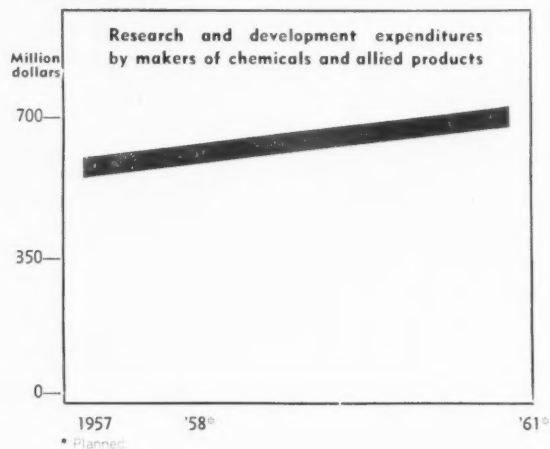
CHEMICAL SALES

Dip in '58, but big growth ahead



CHEMICAL RESEARCH

Bigger budgets every year



Confidence Colors Chemical Spending Plan

Although some of them are acutely feeling the recession, chemical companies still comprise the nation's biggest growth industry—in one respect, at least: the chemical industry's capital spending plans for the next three and a half years top those of all other manufacturing industries.

This is one of the principal findings this week of the 11th annual McGraw-Hill survey of "Business's Plans for New Plants and Equipment" in '58 through '61. Replies to questionnaires circulated last month came from companies accounting for about 40% of industrial employment.

For U.S. industry as a whole, these are the survey's highlights:

- Management plans to stabilize capital expenditures in '59 and maintain the new level—about 20% below last year's all-industry total—through '60 and '61.

- Plans for research and development spending are up sharply for this year and up further for '59-'61. This

research boom augurs additional increases in capital spending—to commercialize the crops of new products and processes that will likely result.

- Manufacturing companies will be putting a larger share of their capital investments into modernization over the next few years. While capacity increased 16% from '55 to '58, present planning calls for only a 10% rise from '58 to '61.

- Management expects unit sales volume to increase substantially in the next three years. Manufacturers look for a 20% hike. This would mean that the average operating rate would rise from 78% (last December) to about 82% in '61. Companies are counting on new products (items not made in '57) to make up 12-14% of '61 sales.

- Capital expenditures planned for '58-'61 are well below the maximum outlays that companies would plan under favorable economic conditions. But there is little likelihood that com-

panies will cut back to minimum planned levels, even if sales should decline substantially from those of '58. This suggests that present plans reflect no widespread fear of a business depression, although they do reflect the immediate problem of spare capacity.

Upswing Seen for '60: In general, chemical process industries' capital spending plans (*table, below*) run parallel to those of most other manufacturing industries. This year's CPI expenditures will be down from last year's peak, and a similar reduction is anticipated in '59. A modest upswing in CPI plant and equipment buying is in the cards for '60, with a tapering-off to follow in '61.

Nevertheless, makers of chemicals and allied products will set the pace in capital spending among all manufacturing industries—more than \$1.3 billion/year during the next three years. Iron and steel companies were first in this respect last year but are

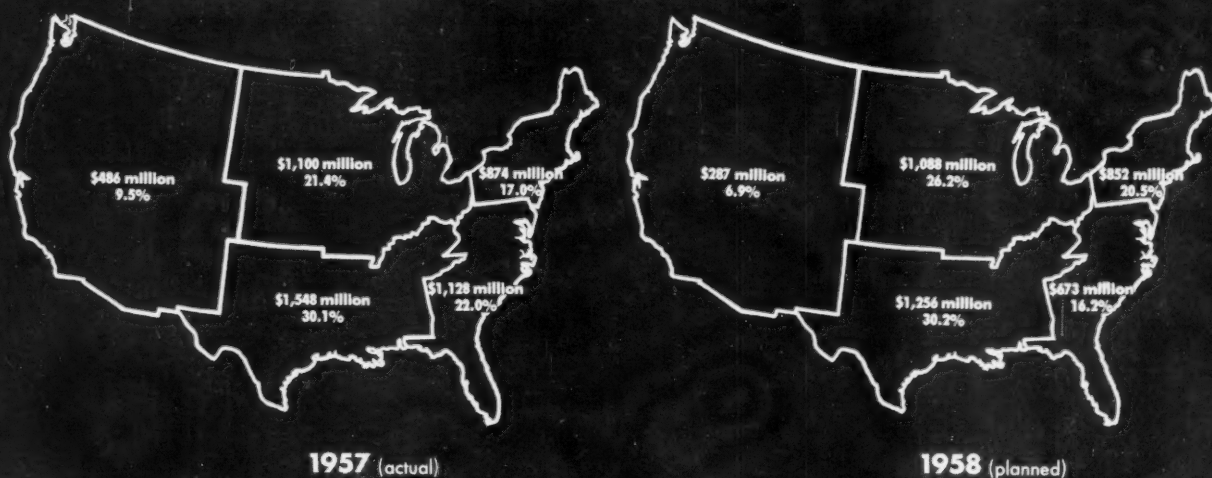
CPI Expansion: The Pace Slows

Present and projected capital spending of manufacturing companies, in million dollars.

Source: 1958 survey by McGraw-Hill Dept. of Economics

| | 1957 (actual) | 1958 (planned) | Preliminary plans | | | Increases in production capacity | |
|-------------------------------------|------------------|-------------------|-------------------|--------------|--------------|-------------------------------------|-------------|
| | | | 1959 | 1960 | 1961 | 1950 to '57 | 1957 to '61 |
| Process industries: | | | | | | | |
| Chemicals and allied products | 1,724 | 1,569 | 1,349 | 1,349 | 1,282 | 76% | 27% |
| Paper and pulp | 811 | 527 | 443 | 474 | 450 | 51% | 13% |
| Rubber | 200 | 172 | 191 | 210 | 210 | 48% | 10% |
| Stone, clay and glass | 572 | 493 | 426 | 455 | 471 | 44% | 15% |
| Petroleum refining | 853 | 768 | 737 | 752 | 647 | 36% | 7% |
| Nonferrous metals | 980 | 627 | 339 | 305 | 302 | 75% | 31% |
| All manufacturing industries | 13,647 | 11,129 | 9,138 | 9,178 | 9,130 | 49% | 14% |

CPI Will Cut Capital Spending in Southeast and Far West



in the runner-up slot this year and will likely rank still lower in the next three years. The machinery industry, in third place this year, will probably be in second place in '59, '60 and '61.

Among the process industries, greatest relative physical growth this year appears to be in drugs and fertilizers. Pharmaceutical companies say their capital spending this year is up 24%. Fertilizer companies report '58 outlays are 20% above last year's.

But it appears that in '61 the tables will be turned. Pharmaceutical companies think their '61 capital expendi-

tures will be 15% less than this year's, and fertilizer makers expect a 21% drop. On the other hand, glass producers—cutting '58 capital expenses 26%—plan a 50% higher spending rate in '61. Similarly, makers of rayon chemicals are spending 35% less this year than in '57 but expect to boost this 17% in '61. And producers of soaps, fats and oils look for an 8% rise in '61 spending, relative to '58 expenditures, which are down 4% from last year's.

Optimistic on Sales: Most chemical process companies appear to be fairly optimistic about sales despite this year's downturn (table, right). If management thinking as to present and future capacity and sales is borne out, here's what will happen to process industries' operating rates:

Chemicals and allied products—a decline from 81% of capacity in '57 to about 79% in '61; paper and pulp—up from 88% to 93%; rubber—up from 80% to 88%; stone, clay and glass—up from 74% to 79%; petroleum refining—up from 90 to 92%; and nonferrous metals—down from 74% to 71%.

New products are very much in the spotlight. Makers of chemicals and allied products anticipate that new products will account for 14% of '61 sales. Pharmaceutical makers, particularly, are banking on products not yet on the market in '57. New-product figures

for other process industries: paper and pulp, 10% of '61 sales; stone, clay and glass, 10%; rubber, 8%; petroleum refining, 4%; and nonferrous metals, 4%.

Research Budgets Rising: Research budget increases are the rule among all process industries and among most other manufacturing categories. Makers of chemicals and allied products plan to increase research and development expenditures from \$567.5 million in '57 to \$595.9 million this year and to \$685.3 million in '61. Comparable figures (in millions) for other

More Modernization

Proportion of capital spending planned for:

| | Expansion | | Replacement and Modernization | |
|-------------------------------|-----------|---------|-------------------------------|---------|
| | 1958 | 1959-61 | 1958 | 1959-61 |
| Chemicals and allied products | 72% | 68% | 28% | 32% |
| Paper and pulp | 41% | 43% | 59% | 57% |
| Rubber | 37% | 37% | 63% | 63% |
| Stone, clay and glass | 60% | 52% | 40% | 48% |
| Petroleum refining | 16% | 29% | 84% | 71% |
| Nonferrous metals | 77% | 70% | 23% | 30% |
| All manufacturing | 44% | 38% | 56% | 62% |

Rising Sales

Relative changes expected in physical volumes of products sold

| | 1957-58 | 1958-61 |
|-------------------------------|---------|---------|
| Chemicals and allied products | —1% | 25% |
| Paper and pulp | 1% | 19% |
| Rubber | —5% | 25% |
| Stone, clay and glass | 1% | 22% |
| Petroleum refining | 3% | 9% |
| Nonferrous metals | —2% | 27% |
| All mfg. industries | —2% | 20% |

process industries: petroleum products, \$231.4, \$245.3 and \$294.4; rubber products, \$76; \$77.5 and \$93; stone, clay and glass, \$63.8, \$67.6 and \$83.1; paper and allied products, \$48.4, \$50.8 and \$57.9.

While companies in the chemicals and allied products category say they plan to spend an average of \$1,327 million/year for new plants and equipment during the next three years, they add that this figure could be as low as \$941 million or as high as \$1,789 million/year, depending on business conditions. In other process industries, corresponding planned, minimum and maximum figures (in millions) are: paper and pulp, \$456, \$285, \$833; rubber, \$204, \$122, \$227; stone, clay and glass, \$450, \$261, \$586; petroleum refining, \$712, \$522, \$845; nonferrous metals, \$315, \$219, \$489.

Catalyst Makers Agree

The recent cross-licensing agreement in settlement of National Cylinder Gas Co.'s suit against eight former employees who formed a competing firm may set a precedent for some disputes involving the industry problem of migrating talent (CW, May 25, '57, p. 41).

Among the defendants in this suit is Ronald E. Reitze, former research director of NCG's Girdler Co. catalyst division, now president of the new firm, Catalysts & Chemicals, Inc. He, with the other seven, left NCG late last summer and set up a company to make catalytic products. NCG brought suit to restrain them from using Girdler trade secrets.

Under the out-of-court settlement, C&C will pay NCG 2½% of gross sales of all catalysts for at least seven years or until payments reach a guaranteed minimum of \$500,000. In return, C&C has permanent licensing rights to know-how and trade secrets about Girdler catalysts developed before Sept. 1, '57.

NCG also won the option to obtain licenses on catalysts developed by C&C before Dec. 31, '59, if NCG can prove they are superior to anything Girdler had on the market before Dec. 1, '57.

NCG dropped charges that the defendants quit Girdler at the same time to disrupt operations, that they tried to lure customers and employees away, and took secret data.

Building on Basic Strength

Stauffer Chemical Co. made it clear last week to New York security analysts that it's still counting on industrial chemicals for basic earnings strength but is actively searching out new ventures with growth potential.

Company President Hans Stauffer and Research Vice-President C. L. Arnold put particular stress on the company's plans to move into several highly promising new fields suggested by research and development results. Newest chemical frontiers: inorganic polymers, particularly those of boron and phosphorus. Stauffer and Arnold said that while big things are expected from the company's joint venture with Aerojet-General in high-energy fuels, the company will probably be putting about as much boron into polymers as into missile fuels.

Acquisition Coming Up: Stauffer disclosed that his company is negotiating for acquisition of a small firm whose operations jibe with work that Stauffer has been doing in "special chemicals." He declined to identify the company.

Finally, he noted, Stauffer is banking on new developments in metal chlorides and in chlorinated solvents for sales growth in the immediate future. He indicated an expectation that rising demand for chlorides of hafnium, zirconium and columbium will more than offset sagging sales of titanium tetrachloride.

Detailing effects of the currently slow market for titanium, Stauffer said the company has stopped pilot-plant production of sponge metal and is keeping its recently completed titanium tetrachloride unit in Ashtabula, O.—built to supply National Distillers' nearby sponge metal plant—on a stand-by basis only. But Stauffer's investment in the Ashtabula unit, he added, is "protected through contracts."

Meanwhile, Stauffer will continue to expand facilities for production of industrial chemicals—sulfuric acid, carbon bisulfide, etc.—that now account for about 76% of sales. Money slated for capital expenditures this year totals \$14 million, about the same as last year's.

Stauffer attributed an anticipated 3 to 4% sales drop this year to the

present slowdown in several of the big industries that have been its principal customers—especially steel, petroleum, and textiles. He emphasized, however, that earnings will still be more than enough to pay regular quarterly dividends.

Miners Plead for Aid

A Senate subcommittee on domestic mining is preparing a report on the current ill-health of U.S. metal-mineral producing industries.

The committee, headed by Sen. James Murray (D., Mont.), last week completed its third probe in as many years into the Administration's mining policy. It was aimed at spurring Interior Secy. Fred Seaton into submitting a promised revision of his agency's long-range minerals program, broadened to include more government support.

Seaton, who is scheduled to present his revised program April 28, is not likely to propose more than a few additions to the federal aids now in existence, including research and development funds and limited incentive purchases and production bonuses for a few metals.

A few tariff boosts and tax incentives may be added.

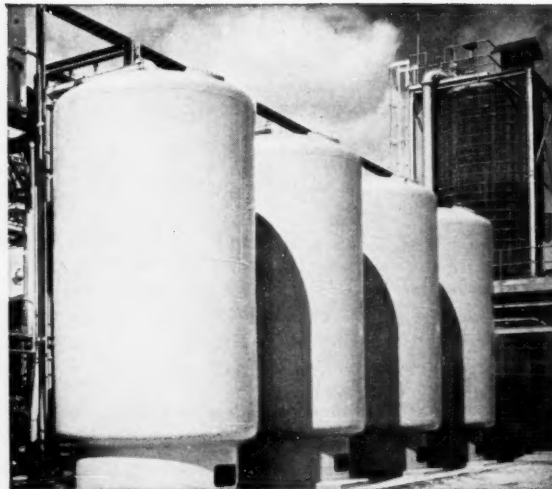
This is far less than what industry spokesmen asked at the recent hearings. Led by American Mining Congress, domestic producers asked sweeping new import quotas and stockpiling programs.

A different tack was taken by International Chemical Workers Union (AFL-CIO), whose Vice-President James Gallagher appeared before the committee late last week. ICWU wants governmental stockpiling, but in addition advocates a direct subsidy to be paid to domestic producers whenever prices are below economic levels. ICWU doesn't want higher tariffs and unilateral import quotas; instead, it calls for international commodity agreements to stabilize production and employment in various countries.

If domestic producers don't get the new legislation they want out of Interior Dept.—and they won't—they'll redouble their pressure for protectionist amendments to the Reciprocal Trade Agreements Act renewal bill.



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• **For expert answers**, more and more management men and their consultants are buying the complete service offered by leading water-conditioning firms. Here's how Permutit (rhymes with "compute it"), a pioneer and largest in the field, tackles a water problem:

• **Water analysis**, study of the problem and past experience provide data on possible methods of treatment. The process offering the best balance of initial and operating cost vs desired quality of treated water is selected.

• **Complete proposal** by Permutit engineers covers type, size and capacity of equipment, price, any special engineering services and guarantees.

• **Manufacturing**—After the proposal is accepted, Permutit designs the entire project, schedules assembly and ship-

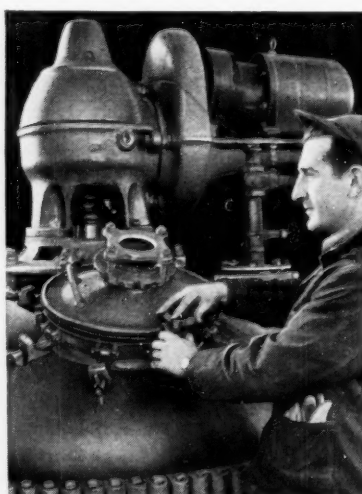
ping. Critical parts, ion exchange resins, control panels are all made in Permutit plants. (No other U. S. firm makes all these components.)

• **Test runs**—Where required, Permutit checks the installation, supervises start-up and initial operation, trains permanent operating personnel.

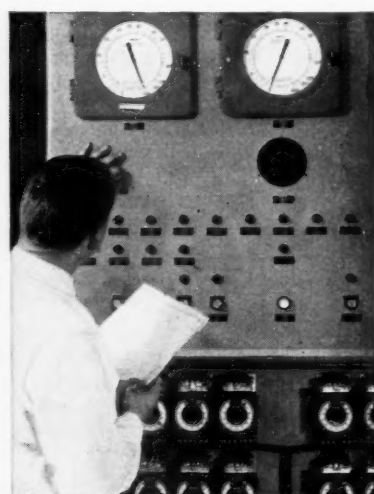
• **For further information** look up the Permutit office in your city or write to The Permutit Company, a division of Pfaudler Permutit Inc., Dept. CW-4, 50 West 44th St., New York 36, N. Y.



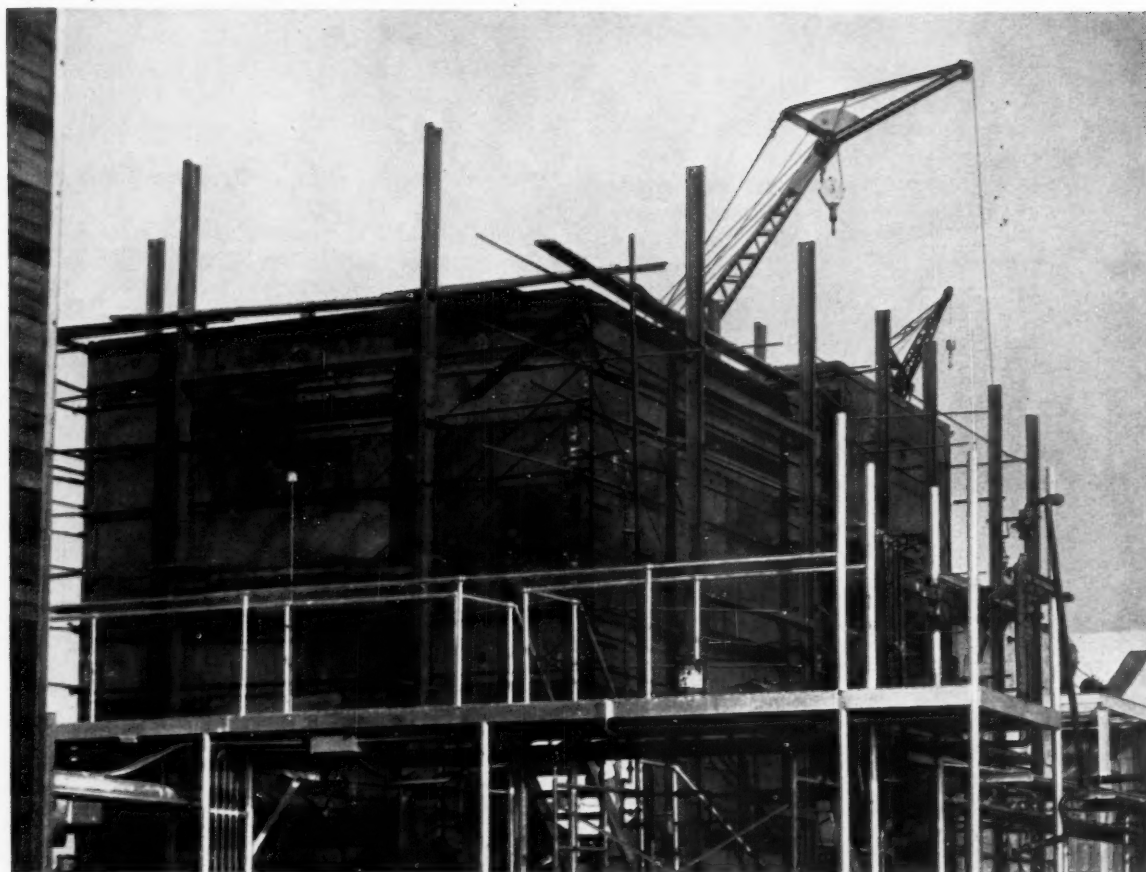
WATER ANALYSIS. Permutit's modern water-analysis laboratory tests over 1200 samples a month!



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key word at Shea: **GROWTH** *to meet your need for phosphates*

GROWTH THROUGH EXPANSION. During the past four years, Shea has constructed three modern sodium phosphate plants. The one shown being built, above, is already in operation, producing 75,000 tons of phosphates a year. All Shea plants need only minor modifications for increased production in the future. As a result, an unfailing supply of phosphates is assured. Shea now ships phosphates from Adams, Massachusetts, Jeffersonville, Indiana, and Dallas Texas. A steadily growing stream of phosphorus is provided by the plant at Columbia, Tennessee.

GROWTH THROUGH RESEARCH. The list of phos-

phate products made by Shea has grown rapidly in eight years. Shea was the first to develop spray-dried sodium phosphates to be sold to the soap industry. Now, Shea is embarking on plans for further diversification. Two laboratories—at Adams, Mass. and Jeffersonville, Indiana—are busily engaged in research on an entirely new range of phosphate chemicals. Included are the increasingly important organo-phosphates.

GROWTH THROUGH SERVICE. Because Shea offers phosphates of consistent high quality, reliable service and dependable delivery, more and more users of phosphates are turning to Shea.



SHEA CHEMICAL CORPORATION

114 E. 40th St., New York 16, N. Y., Oxford 7-4553

EXPANSION

Photochemicals: General Aniline & Film Corp. has completed its new \$1-million plant near Los Angeles to produce printing paper and other sensitized materials for its Ozalid Division. The new installation will serve 11 Western states, parts of Alaska, Canada and Hawaii.

Beryllium Hydroxide: Mineral Concentrates, Inc. (Denver), will build a \$250,000 beryllium hydroxide plant at Loveland, Colo., to process ore from the Crystal Mountain area. Operations are slated to start in June.

Glass: Pittsburgh Plate Glass Co. will build a \$3-million glass tempering plant near Crestline, O.

Hydrocarbons: Polymer Corp. Ltd. will build a diversified hydrocarbon pilot unit at its Sarnia, Ont., plant to test stereospecific catalysts for new hydrocarbon rubbers. Cost: "in excess of \$500,000." Polymer is completing a \$1.2-million addition to its research and development laboratories.

Cement: The Flintkote Co. plans 45% production expansion of its Louisville, Ky., subsidiary, Kosmos Portland Cement Co. by mid-'59. Capacity will be upped from 2.2 million to 3.2 million bbls./year.

Natural Gas: El Paso Natural Gas Co. will build a \$5-million gas processing plant at Opal, Wyo. The 250-million-cu.ft./day unit will strip propane and natural gasoline from wet gas. Fluor Corp. will design and build the plant. Completion date: early '59.

COMPANIES

National Cylinder Gas Co. (Chicago) will change its name to Chemetron Corp. if stockholders approve on May 6. The new name (derived from the words chemicals, metals, electronics) will better define company operations.

American Cyanamid Co. will merge its farm and home division and phosphates and nitrogen division into a new agricultural division. Effective date: April 1. The merger, says the company, will "streamline and more efficiently coordinate Cyanamid's agricultural operations."

Phillips Petroleum Co. has placed all Canadian operations under one manager, with headquarters at Calgary, Alta. Canadian operations (except land and geological work) had been directed from the U.S.

U.S. Ceramic Tile Co. (Canton, O.) common stock is now listed on the American Stock Exchange. On

the first day (April 7), 400 shares were traded. The firm's sales for the year ending Oct 31, '57: \$13.8 million. Profits: \$445,212.

Polymer Corp. Ltd. (Sarnia, Ont.), government-owned producer of synthetic rubber, reports a 28% drop in net profits, despite a 4% rise in gross income. Sales rose from \$71.6 million in '56 to \$74.6 million in '57. But profits—reflecting increased U.S. competition and sliding natural rubber prices—dropped from \$9.5 million to \$6.8 million. Polymer's \$6.5-million capital investments last year included a just-completed latex-handling plant.

Tennessee Gas Transmission Co. has acquired 93.4% of the common stock of the Grand Central Rocket Co. (Redlands, Calif.), manufacturer of solid fuels and rocket engines. The diversifying pipeline company paid Grand Central stockholders 58,842 shares of 5% convertible second preferred stock, worth about \$5.8 million. Management at the rocket company will remain the same.

FOREIGN

Chemicals/Germany: A new trade agreement between Russia and West Germany is U.S. chemical producers' latest warning of increasing competition from behind the Iron Curtain. The pact calls for a \$750-million trade exchange during the next three years. Among the materials promised by Russia are cellulose, oil and oil products, asbestos, manganese, chromium, ferroalloys and chemical products of a variety of descriptions.

Pharmaceuticals/Brazil: Merck & Co. has started production in its new Campinas (Sao Paulo) plant. Products include bulk steroid hormones and vitamins, human and animal feed supplements.

Petrochemicals/Rumania: Under Russian supervision, ground has been broken near Onesti (Moldavia province) for Rumania's first synthetic rubber plant. Projected first-stage output: rubber, 25,000 metric tons; phenol, 9,000 metric tons; acetone, 5,500 metric tons. Final plant capacity will double these levels.

Coal Chemicals/England: The National Coal Board has completed a \$25-million carbonization and by-products plant at its Manvers Main Colliery in South Yorkshire. Capacity, which was not increased by the modernization, includes: crude tar, 50,000 tons/year; ammonium sulfate, 8,500 tons; concentrated ammonia, 4,000 tons; crude benzene (BTX cut), 3.5 million gal.; gas, 7.1 billion cu. ft. BTX from Manvers and other NCB units is separated at the site into benzene, toluene, xylene and solvent naphthas.



“Dutch Boy” Stabilizer research helps give vinyl flooring color a big lift

The latest in asbestos-filled floor tiles is *color*!

Oyster whites. Soft pastels. Rich reds, blues, and greens. Delicate marbling. Bright new color that lasts like never before.

Credit “Dutch Boy” Stabilizer research for new ways to get such color

With vinyl flooring the problem of color is fourfold. In processing, you have darkening of stock on the hot calender to contend with . . . plus shifts in hue caused by unavoidable

impurities in asbestos filler. On the floor, it's progressive darkening from ultra-violet action plus additional hue changes that causes the trouble. Sulfide staining is a problem, too.

A recent National Lead development. “Dutch Boy” Temex® 3 Stabilizer, does away with all four flooring color problems. Solves staining, too. It provides unique double action . . . the best available stabilization against light and heat, plus a “walling off” of impurities that renders them harmless.

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National Lead chemical research has come up with more than 20 widely used vinyl stabilizers and four unusual thixotropic gelling agents. Each solves problems of product quality in many industries. Electrical insulations, automotive upholstery, anti-fouling paints, inks, many other products benefit.

For details, for technical help in applying these useful “Dutch Boy” chemicals, mail the coupon below.

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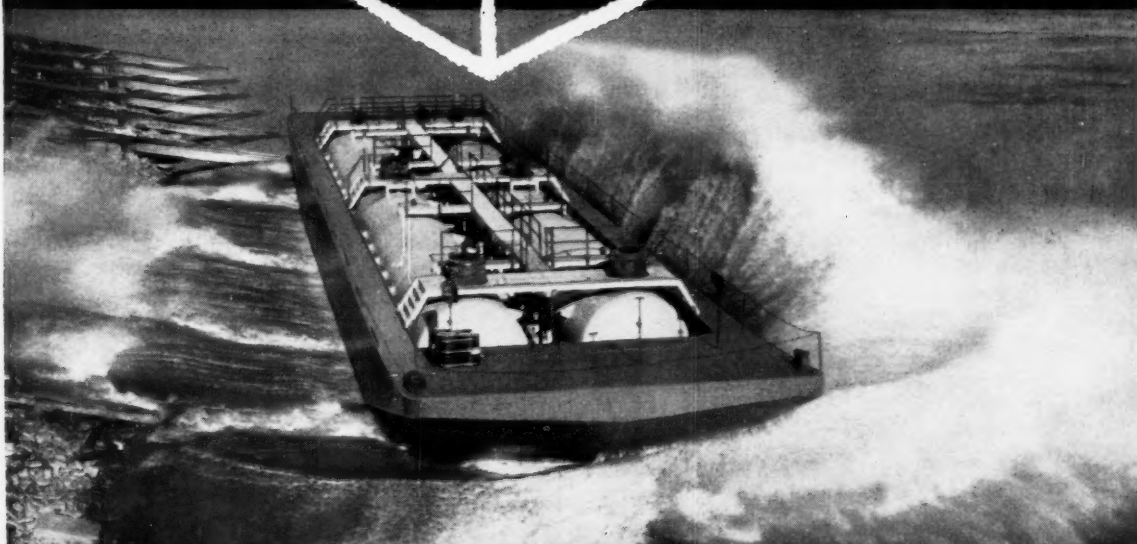
... and get the plus of a name you know ... for quality



INGALLS LAUNCHES BARGE TO TAME CAUSTIC SODA

Liquid caustic soda has been regarded as a "hard to handle" cargo because it "freezes" and becomes solid at normal temperatures. The recently launched FMC-101, built at Ingalls' Decatur, Alabama, yards for Westvaco Chlor-Alkali Division of Food Machinery and Chemical Company, makes it practical to transport liquid caustic soda by water, which is by far the most economical method. First of three barges, each designed to transport 1200 tons of caustic soda; the FMC-101 incorporates rubber-coated tanks which are equipped with steam heating coils and foam-glass insulation to maintain "above freezing temperatures." Two FMC Peerless high capacity, submerged turbine pumps provide for fast discharge of cargo. Ingalls' improved bow design reduces towing resistance and speeds trip time.

Whether your next barge is large or small, specialized or conventional, get a bid from Ingalls: You, too, may profit from Ingalls' wealth of experience in designing and building extra economy and efficiency into water transportation units.



THE INGALLS SHIPBUILDING CORPORATION

Executive Offices: Birmingham, Alabama

Shipyards: Pascagoula, Mississippi (Two yards on the Gulf)
Decatur, Alabama (Largest yard on the Tennessee River)

Washington Newsletter

CHEMICAL WEEK

April 19, 1958

Labor Dept. is grinding out new minimum wage standards for chemical process companies doing business with federal agencies. In the next few weeks, Labor Secretary James P. Mitchell is expected to issue new, and higher, pay floors for soap and chemical detergent and drug and medicine producers, using his authority under the Walsh-Healey Public Contracts Act to determine prevailing minimum wages.

The floors apply only to firms holding federal procurement contracts of \$10,000 or more, and cover only orders acquired after the new minimums become effective. But, in practice, the higher minimums for Walsh-Healey firms eventually spread to companies that do not deal with the government. These firms find that such wage boosts for their lowest-paid workers lead to across-the-board increases. Object: to maintain in-plant differentials for the better-paid, skilled workmen.

Paint and varnish makers must soon meet the 50% hike ordered by Mitchell last week in their Walsh-Healey minimum. The new floor for these plants is \$1.50/hour and will take effect May 6 unless there's a strong industry protest. Mitchell also wiped out the long-standing regional wage differential for Southern plants after finding that competition for government paint contracts is nationwide. The industry had urged a \$1.05 floor in the South, and \$1.25 elsewhere.

The ruling, when it spreads to companies not vying for the government's \$25 million or so in paint purchases, could force widespread wage increases, particularly in the South. Labor Dept. figures show that the impact will fall on more than half the industry's plants—since 52% of all paintmaking establishments pay some of their workers less than the newly prescribed \$1.50/hour minimum. These outfits, in turn, employ 31% of all paint workers.

Paper and pulp, tires and tubes plants are next on the list. The Labor Dept. has completed wage surveys of both industries and soon will be scheduling public hearings for summer, to get worker and employer views on new wage floors. For tires and tubes makers, this will be the first encounter with the Walsh-Healey law; pulp and paper firms, on the other hand, will be faced with upward revision of their existing wage minimum—the \$1.15/hour floor, in effect since Dec. '55.

Congress has taken another look at chemical additive bills. For two days, the House Commerce Health and Science Subcommittee, under Rep. John Bell Williams (D., Miss.), heard government and food industry witnesses debate the same controversial issues that have blocked a decade of efforts to write a mandatory pretesting law to cover chemicals used in food processing.

Food and drug officials hinted that FDA now is willing to go at least half way toward meeting the industry's insistence on a "grand-

Washington Newsletter

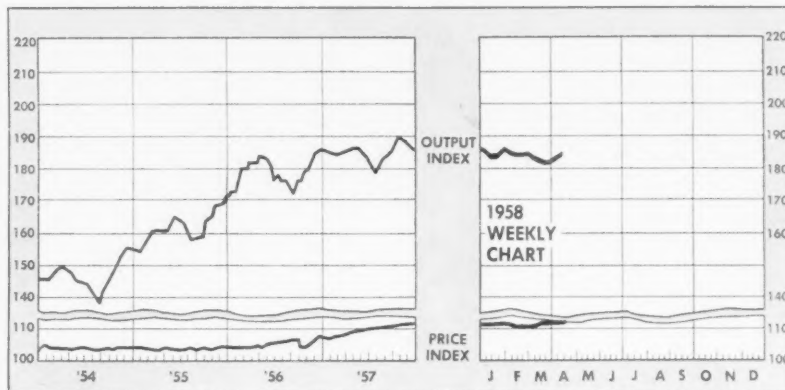
(Continued)

father clause" to exempt existing additives from pretesting. And, for the first time, Dept. of Health, Education and Welfare has submitted its own bill. In previous years, government witnesses limited themselves to comment on proposals of other groups. Their new tack is more likely to convince Congress that the Administration is serious about getting a chemical additive law.

There's a slim chance that Williams will press for a subcommittee decision this year on the dozen or so pending additive bills—but there's scarcely any prospect of final action. Witnesses for the meat packing and dairy industries made clear again this week that they will stand firm against proposals (1) to bar many nonessential additives from the market and (2) to give FDA final authority on additives usage, when scientists disagree on their safety.

Drug manufacturers will be heard in "fair trade" bill hearings that the House Interstate Commerce Committee has scheduled for April 28-May 1. "Fair trade" strategists are stressing the small-business angle of resale price maintenance, in the light of little-retailers' recession woes.

Regardless of what develops at the upcoming committee sessions, there's no chance of legislation this year.



Business Indicators

WEEKLY

| | Latest Week | Preceding Week | Year Ago |
|--|-------------|----------------|----------|
| Chemical Week output index (1947-49=100) | 184.5 | 185.5 | 185.0 |
| Chemical Week wholesale price index (1947=100) | 111.0 | 110.9 | 108.6 |
| Stock price index of 11 chemical companies (Standard & Poor's Corp.) | 38.27 | 38.34 | 42.75 |

MONTHLY

Trade (million dollars)

| | Manufacturers' Sales | | | Manufacturers' Inventories | | |
|-------------------------------|----------------------|-----------------|----------|----------------------------|-----------------|----------|
| | Latest Month | Preceding Month | Year Ago | Latest Month | Preceding Month | Year Ago |
| All manufacturing | 25,593 | 26,350 | 29,534 | 52,461 | 52,911 | 52,918 |
| Chemicals and allied products | 1,803 | 1,836 | 1,930 | 3,837 | 3,824 | 3,643 |
| Petroleum and coal products | 2,760 | 2,774 | 2,960 | 3,583 | 3,615 | 3,197 |

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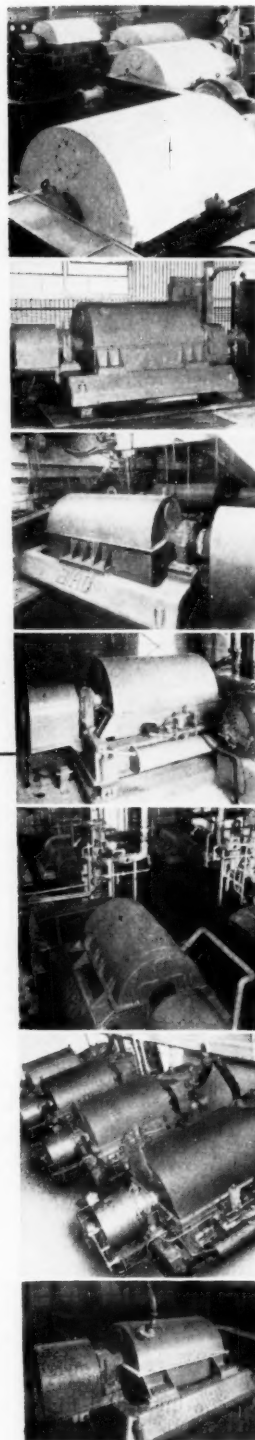
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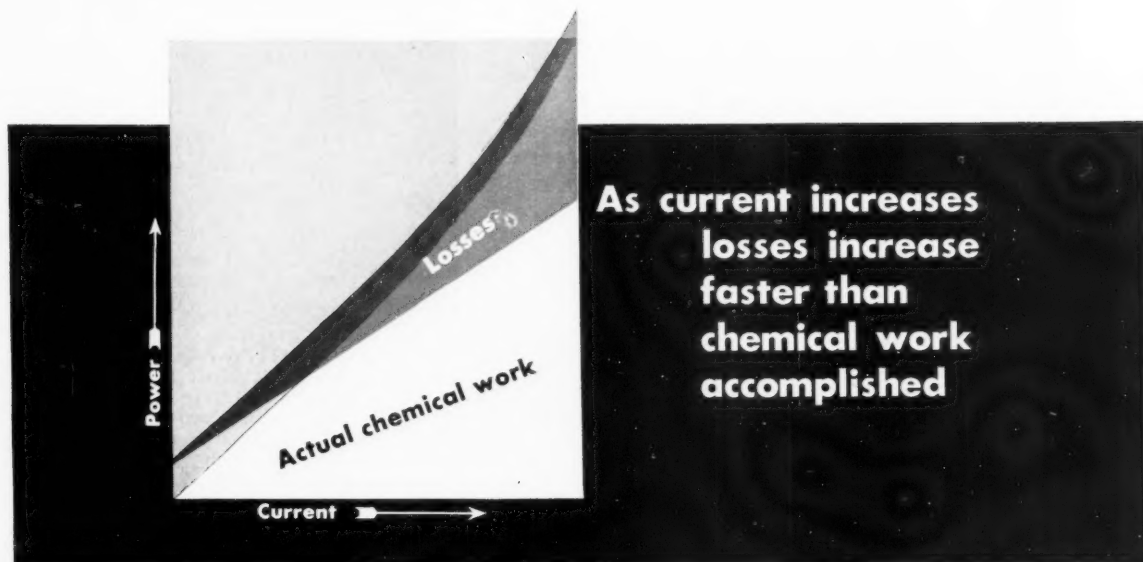
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PRODUCTION

In electrolytic cell operation:



For Cell Operators: What Price Efficiency?

"Management at many CPI plants that operate electrolytic cells are short-changing themselves, because they seem to have lost sight of some basic electrical considerations. They now operate their plants in a way that can result in high power and equipment costs, and even in equipment damage." That's what I. K. (Mike) Dortort and Larry Keltz, engineers with I-T-E Circuit Breaker (Philadelphia)* told CW last week.

These electrical principles—ranging from 30-year-old cell-current theory (see graph above) to voltage regulation with modern semiconductor (e.g., silicon, germanium) rectifiers—are already guides to the operation of some plants. But Dortort and Keltz seek to spark still greater awareness and regard for them, since they believe these principles can be helpful in the most complex cell operations, where, at best, procedures are a compromise of many factors.

*Dortort is chief engineer of the transformer and rectifier division; Keltz is sales engineer. Their views are based mainly on operation of high back-emf. cells (e.g., chlorine-caustic, persulfate).

For example (graph), when the current in the cell is increased, power losses (mainly heat) increase at a rate faster than the rate of work accomplished (product produced). Yet, some plants operate at high levels of current (above cell rating) to increase capacity—and pay the penalty of unjustifiably high power costs.

In a few cases, plants even run the risk of damaging equipment because they circumvent safety cutouts to push through higher-than-rated current, says Dortort. One plant even resorted to cooling its overloaded transformers with water sprays.

Over-all Saving: Although few firms subscribe to overloading to the point of causing equipment damage, many do hike the current to increase capacity. While Dortort regards this as warranted only in an emergency, these firms declare that when all the operating factors are taken into account, over-all costs generally come down, even though power costs may go up.

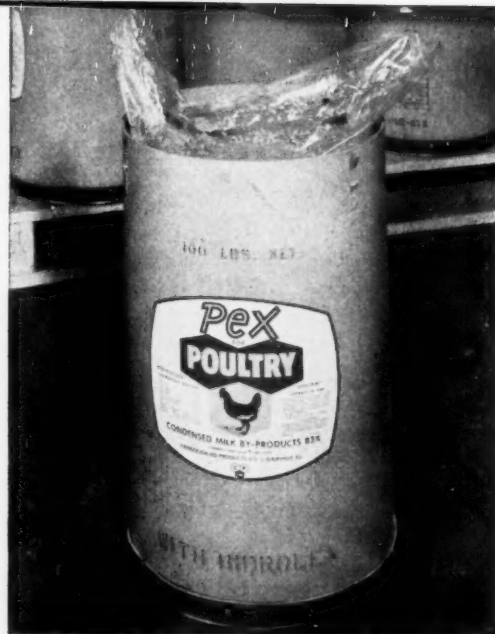
For example, these firms say, although anode deterioration increases

along with power, there's a drop in plant investment cost (depreciation) operating labor, and overhead. And, on a per-ton-of-product basis, repair labor and material required remain essentially the same (most cells are overhauled after production of a certain tonnage of product).

One firm also says that on strictly electrical considerations, some cell losses are not as great as might be expected because as current is increased, the resistance actually decreases. This nullifies to some extent the rapid increase in losses caused by the current factor being mathematically squared (in the equation that gives heat loss).

Agreement in Cuts: There is greater agreement between Dortort and many CPI firms about current considerations when production cutbacks are made. It's generally felt that unless cutbacks are severe, reducing cell current is cheaper than cutting out cells. In addition to lowering power costs per unit of product, anode deterioration is cut and, says Dortort, maintenance may be cut.

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Fig. 2108—Monel or Nickel "Y" Valve for 150 pounds W.P. Outside screw rising stem and yoke. Screwed ends. Flanged end or socket welding end valves can be supplied.

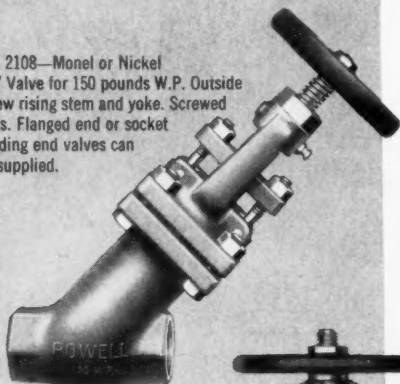


Fig. 2453 SG—Large size O.S. & Y. Gate Valve for 150 pounds W.P. Solid wedge disc. Can also be furnished with split wedge disc. Dimensions conform to latest standards.



Fig. 1836—Monel Metal
Fig. 1839—Nickel
Small Union Bonnet Globe Valve for 200 pounds W.P. Available with screwed, flanged or welding ends; also in angle pattern.

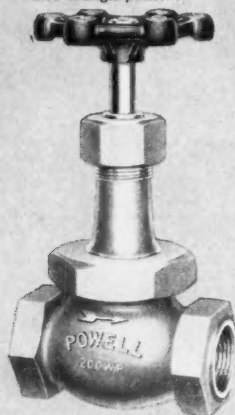


Fig. 1843—Monel Metal. Fig. 1845—Nickel. Small size Check Valve for 200 pounds W.P. Screwed-in cap. Has straightway flow area through valve body when disc is in wide open position. Can also be supplied with flanged or socket weld ends.

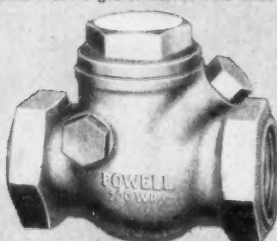


Fig. 2493—Bolted flanged bonnet Gate Valve for 150 pounds W.P. Outside screw stem rises through revolving bushing in upper yoke. Interchangeable solid or split wedge discs. Screwed or socket weld end valves also available.

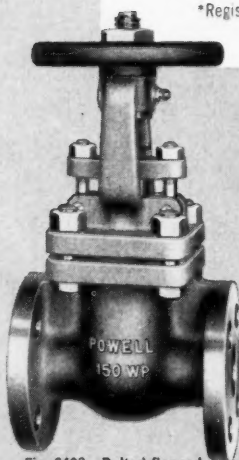


Fig. 1828—Monel Metal
Fig. 1830—Nickel Inside screw rising stem Gate Valve for 200 pounds W.P. Accurately guided solid wedge disc. Also available with flanged or socket weld ends.

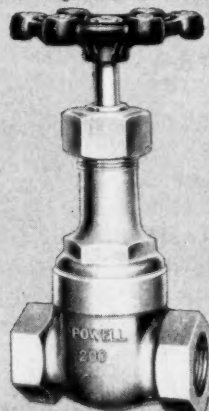
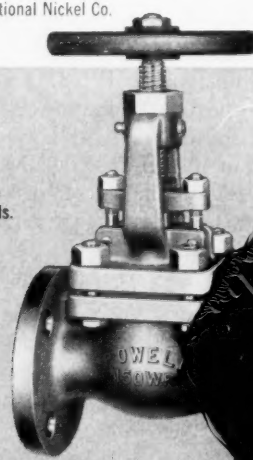


Fig. 2477—Small flanged end, outside screw rising stem and yoke Globe Valve for 150 pounds W.P. Bolted flanged bonnet. Can be furnished with screwed or socket weld ends. Angle Valves available.



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PRODUCTION

Many firms, however, find maintenance costs remain unchanged and, in a few cases, even increase.

But, insists Dortort, even this generally accepted principle—to drop cell current rather than cut out cells—is ignored at a few plants. At these plants, operation at high current is continued and some cells are cut out even where small production cutbacks are planned. Most firms will stop some cells and shut down some circuits when production cutbacks are severe. In this way, operating labor costs are materially reduced.

There's another reason why some firms prefer to reduce output by closing down cells rather than reducing current, says Dortort. This is to get higher "current efficiency." Current efficiency is a measure of actual current used, compared with theoretical current required. It's important in giving a check on the condition of the cell—e.g., losses due to leakage or recombination of products separated. But current efficiency is a characteristic of the particular cell operation, can't be increased to any great extent. It may increase slightly with higher currents, but that's incidental to most firms, and some say they ceased 10 years ago to concern themselves with the controversy.

Voltage-Range Premium: While Dortort is most concerned about misuse of equipment, Keltz is mainly concerned with the cost premium many CPI firms pay when they insist on voltage regulators to assure a wide voltage range for the rectifier systems they purchase.

Companies generally cite two reasons for specifying the wide range: first, low voltage is required during cell startup to prevent a cell-damaging surge of current; second, firms install their rectifier systems with an eye to future addition of cells to their system which increases the voltage re-

quired and Keltz both accept the fact that some voltage range is required by the rectifier since cell voltages vary during normal operation. It is the wide range that is costly.

As a rule of thumb, the cost of building in voltage regulation can be determined by multiplying the rated kva. of the rectifier system installation by one-half the percent of voltage range desired. The kw. figure obtained, if multiplied by 50, gives



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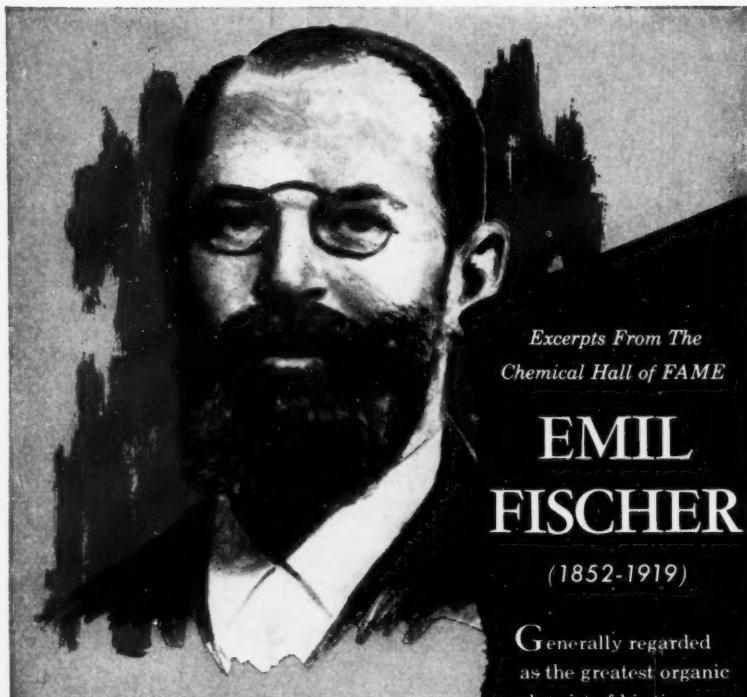
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PRODUCTION

the approximate dollar cost of regulation. But for small installations (under 100 kva.) the \$50/kw. figure does not hold true—it's much higher because the cost of the rectifier itself is proportionately higher.

Dortort points out that low-voltage regulation for startup can be conveniently and cheaply taken care of by installing an inexpensive resistor in the line. The resistor is cut out once operational voltage is achieved and the cell is working normally. Yet, some firms haven't been sold.

Wide voltage range (35-50%) is already built into mechanical rectifiers. Commutating reactors, which made the mechanical rectifier a reality, are a form of voltage regulation.

Although the newer semiconductor rectifiers are less expensive than mechanical rectifiers, building in wide-range voltage regulation brings their cost up to that of the mechanical rectifiers. Of the four methods of regulation, step-voltage (TCUL) regulators give rough control, while induction regulators are practical and give smooth control. But induction regulators are not available for large-scale installations.

The other methods—primary and secondary saturable reactors—reduce the power factor, which can add to operating costs. Primary saturable reactors have a bad effect on the power factor. Secondaries, which are equivalent to commutating reactors in mechanical rectifiers, have less effect, and good power factor can be regained by including a step or an induction regulator in the setup.

Temporary Cost: But some CPI firms counter the higher cost of wide-range regulation with the argument that the over-all cost is actually less, once the cell room has been expanded. One firm reports that if parallel cell lines and electrical equipment are installed later, instead of merely adding cells to the existing line, over-all cost can be as much as 20-30% higher.

Another firm maintains that initial outlay for wide-range regulation is small when all cell-room costs are considered. At one installation, the electrical equipment cost, of which regulation was only a part, was about one-third the total plant cost. And once the installation was expanded a few years later, the original outlay for electrical equipment was only

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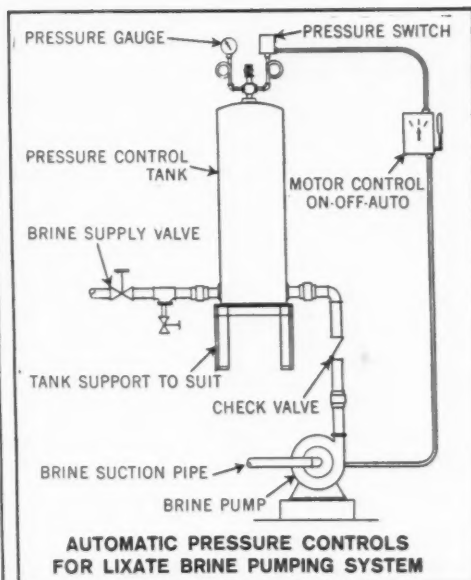
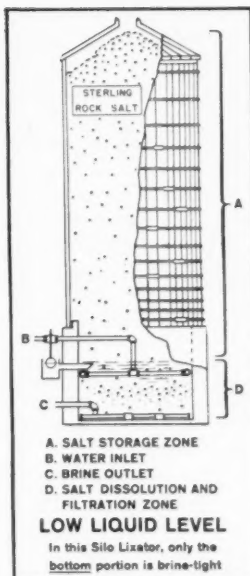
Excellent as this brine-making equipment is, International is constantly working to improve Lixator designs. From time to time, we also introduce special new Lixator attachments. Here are some improvements and attachments that can make production of Lixate brine more efficient and economical in your plant.

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A common method of waterproofing is to line the floor and bottom portion of the walls with concrete. Lixate brine is made in this lower tank portion, with dry salt occupying the space above the liquid level.

Electrode controls. To regulate the liquid level in a Lixator, electrode controls are often used. This is an excellent alternative to the standard float controls in many Lixator installations.

Two electrodes of different length are protected in a length of pipe, then immersed in the Lixator. Whenever the liquid level falls below the lower electrode, the electric circuit is broken, a relay opens to close a load contact, and the water valve is opened. When the liquid level rises to the higher electrode, the circuit is closed, and the relay closes to shut the valve. In this way the brine level is maintained between the desired limits in the Lixator—continuously and automatically.



Pressure controls . . . for brine systems. International has introduced the technique of automatically starting and stopping Lixate brine pumps by pressure switches. If a valve is opened anywhere in the brine distribution piping, brine flows and brine line pressure drops slightly. This, in turn, activates a switch, starting the pump, which withdraws brine from the Lixator. Everything is automatic. The operator only opens and closes a brine valve at the point of use.



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In many other ways, brine meters and other Lixator attachments can boost brine-making and brine-using efficiency. To find out how you can benefit from such devices, contact International. One of our experienced sales engineers will gladly explain about brine-density and brine-flow regulators, piping layouts, continuous brine-dilution devices, etc. He can also recommend the type and size of Sterling Salt best suited to your needs.

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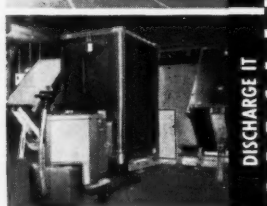
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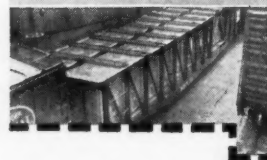
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8. Tote System can be adapted easily to future requirements. Plant layouts can be changed simply by re-locating discharge stations. Operations can be expanded merely by procuring additional Bins. And Bins can be used interchangeably for different products.
9. Tote System, in small and medium sized installations, requires no more labor to operate than a fixed storage bin system. In extremely large installations, another man may be required, but, in most cases, his time is more than offset by the elimination of highly-paid electronic experts needed to maintain and operate complicated fixed bin storage and conveying systems.

PRODUCTION

one-seventh the total plant cost.

But a third firm says expansion should never be assumed in original design and installation.

Dortort and Keltz recognize that objectives differ. They agree that chemical production is the controlling factor, but contend that electrical engineering principles are not always given sufficient consideration, that the result is above-optimum costs. If CPI firms are willing to listen, the future will tell.

EQUIPMENT

Multipurpose Steel Frames: Bild-A-Flex is a new steel framing made by Republic Steel Corp.'s Berger Division (Canton, O.). Framing comes in 10- and 12-ft. lengths with prepunched slots for easy nut-and-bolt assembly into framework for storage racks,



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Chemical Week • April 19, 1958

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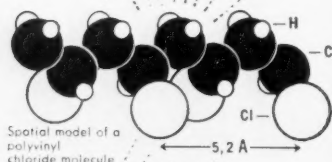
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EUROPEAN TERMINALS: Dordrecht (Rotterdam), Netherlands

East Liverpool, Ohio
Antwerp, Belgium

Madison, Indiana Brownsville, Texas
Ludwigshafen, Germany Livorno (Leghorn), Italy



plastics perfumery

In the expanding plastics world of today, vinyls are often found in end products that have close personal contact with the consumer. Belts, purses, shower curtains, raincoats, seat covers and shoes represent an increasingly large outlet for vinyls... and in such "close-up" items malodor, caused by certain stabilizers and plasticizers, can become a definite sales deterrent. The D&O Industrial Odorant Labs have had wide experience in the development of both masking agents and fragrance additives for the highly specialized field of plastics perfumery. No line is offered... for each formulation and each process is different, and requires individual attention. Whether your vinyl product requires the masking of malodor or the addition of a pleasant, sales stimulating fragrance... the D&O Labs are equipped to provide it for you, tailor made! Consult D&O.



Our 159th Year of Service
DODGE & OLCOTT, INC.
180 VARICK STREET • NEW YORK 14, N.Y.
Sales Offices in Principal Cities

Essential Oils • Aromatic Chemicals • Seasonings
Perfume Bases • Flavor Bases • Dry Soluble

PRODUCTION

scaffolding, catwalks, ramps, enclosures, machine guards. Frames may be cut to desired length, leftovers joined together or used as braces and cleats.

Rupture Disks: Falls Industries (Solon, O.) has increased the range of its impervious graphite rupture disks for use from full vacuum to 300-psi. pressure. New disks are available in 25-lb. increments from 175- to 300-psi. burst ratings, diameters from 2 to 24 in. Service temperature: to 650 F; accuracy: $\pm 5\%$ of rated burst.

Dissolved-Oxygen Analyzer: For continuous detection of trace quantities of dissolved oxygen (to 1 part per billion) in high-purity water, Beckman's Process Instruments Division (Fullerton, Calif.) offers its new Model 70 analyzer. The instrument gives 90% response about 2 minutes after the sample enters; accuracy is $\pm 5\%$ of reading. Ambient temperature range: 50-110 F; sample temperature: 100 F max. Instrument ranges: 0-25, 0-50, 0-250 ppb., plus a 10-fold range for leak tracing.

Vibrating-Screen Mounter: Where vibrating-screen cloth panels must be changed frequently to meet a variety of size requirements, Hewitt-Robins Inc. (Stamford, Conn.) offers its new time-saving device for mounting and tensioning. It has special slotted bolt and wedge with retaining and swivel washers. A few hammer blows on a wedge releases a screen-cloth unit or mounts another unit with uniform tension at all points. H-R says the cloth change can be made in about one-half the time required for conventional threaded-bolt, locknut units.

Defect Detector: Small internal defects in moving machinery can be detected quickly with the new binaural engineer's sound detector of Burke & Co. (Worton, Md.). The unit has twin detectors that enable the user to listen to two points simultaneously. Among the recommended applications: detection of stuck or leaking valves in compressors and pumps; worn brushes, foreign matter, pitted shafts and bearings in electric motors; efficiency of steam traps; leaks in gas and liquid lines. Unit has extension rod for reaching remote places, an interchangeable bell stethoscope for detecting pressure leaks around head gaskets, manifolds.



INDUSTRIAL CHEMICALS

We mine Copper, Sulfur, Iron and Zinc and are basic producers of their chemical derivatives. Our technical know-how and basic position in these minerals is your assurance of exacting quality control, strict uniform consistency and a plentiful supply.

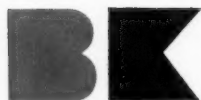
| TC | COPPER |
|--------------------------------------|---|
| COPPER SULFATE | Industrial Crystals and all common grades. |
| MONOHYDRATED COPPER SULFATE | 35% Copper as metallic packaged in steel drums at no extra cost. |
| COPPER CARBONATE | 55% Copper as metallic. Light and dense grades. |
| CUPRIC CHLORIDE | 37% Copper as metallic. Available in polyethylene-lined drums or bags. |
| CUPRIC OXIDE | Minimum 76% Copper as metallic. Technical grade... NOT A BY-PRODUCT. |
| TC | SULFUR |
| SULFURIC ACID | Various strengths and grades 60 through the Oleums. Available in tank cars or tonnages. |
| LIQUID SULFUR DIOXIDE | Highest commercial quality, available in tank cars, tank wagons, ton cylinders and 150-lb. cylinders. |
| CHLOROSULFONIC ACID | Iron less than 1.0 ppm as loaded. Water white. Delivered in glass-lined tank wagons, also in stainless steel drums. |
| SODIUM HYDROSULFITE | T-C HYDRO is a dry, white, free flowing, crystalline powder of uniform particle size and structure. It is dust free, assuring highest stability and uniformity. |
| PARATOLUENE SULFONIC ACID, ANHYDROUS | Other organic Sulfonic Acids. |
| TC | IRON |
| FERRIC IRON SULFATE | Partially hydrated, free flowing granular form. Available in bags or bulk. |
| TC | ZINC |
| MONOHYDRATED ZINC SULFATE | 36% Zinc as metallic. White, free flowing powder. |
| ZINC OXIDE | Secondary Zinc Oxide. |
| TC | MANGANESE |
| MANGANESE SULFATE | Designed specifically for inclusion in mixed fertilizer. |
| MONOHYDRATED MANGANESE SULFATE | 93% Mn SO ₄ · H ₂ O. Highest purity, technical grade... NOT A BY-PRODUCT. |
| MANGANOUS OXIDE | Minimum 48% Manganese as metallic. Feeds, fertilizers, spray or dust grades. |

Samples, specifications and detailed information upon request.

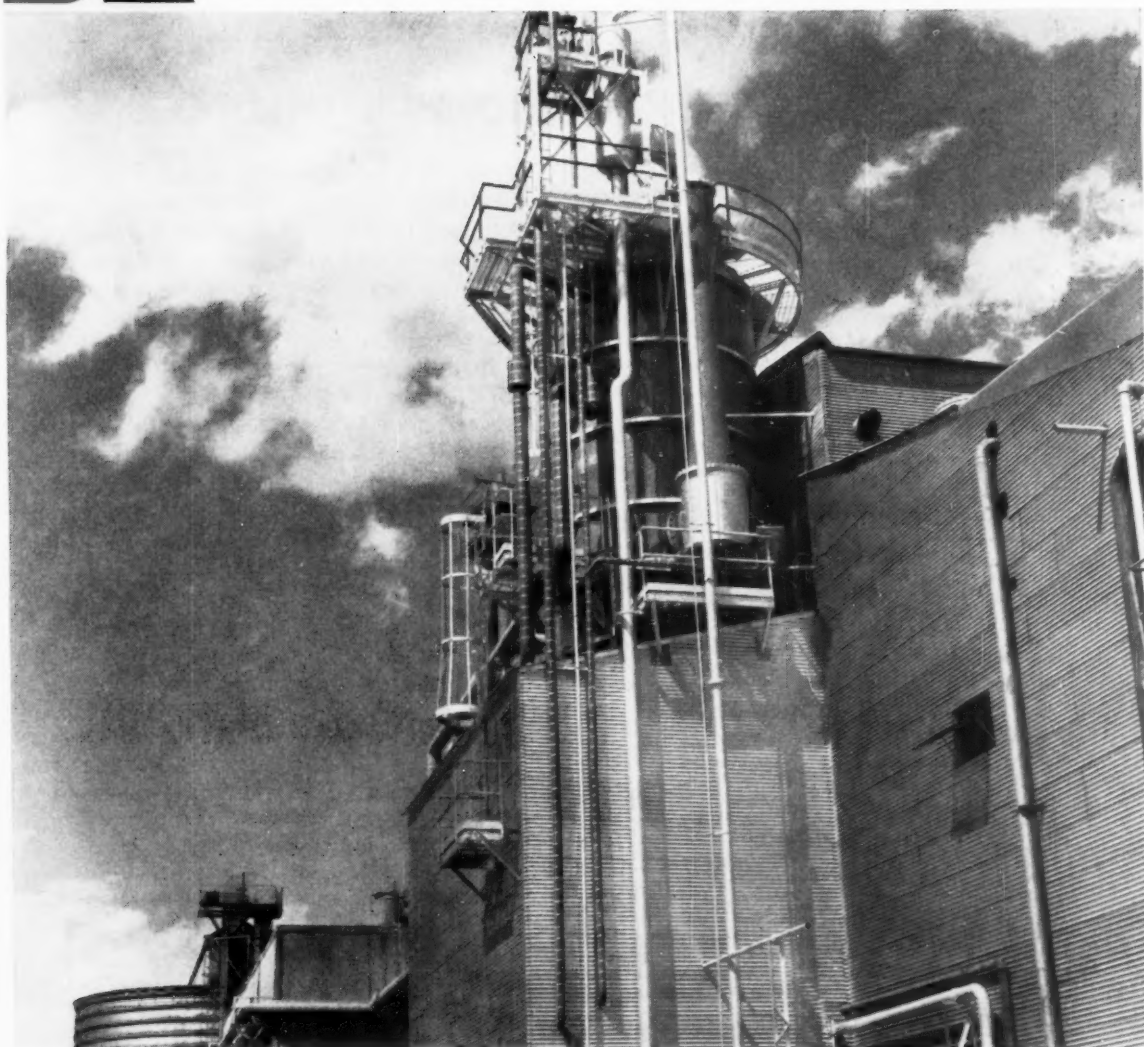


TENNESSEE CORPORATION

617-29 Grant Building, Atlanta, Georgia



Blaw-Knox builds for Honeyamead . . . a continuous, high vacuum deodorization unit with a daily capacity equivalent to 8% of all the soybean oil processed in the country. This modern unit features a special soaking section that guards against flavor reversion.



World's largest deodorizer upgrades 600,000 pounds of soybean oil a day

With this giant deodorizer Honeyamead Products Company completes the third step of an expansion program that started in 1953. At that time Blaw-Knox designed and built a 500-ton-per-day Rotocel solvent extraction plant for this progressive company. By 1956 facilities were expanded and production climbed to a record breaking 1200-tons-per-day. Now this pace setting deodorizer makes Honeyamead a leader in large scale continuous refining of soybean oil into edible products.

Such pioneering projects are typical of the over 100 fats and oils plants engineered and built by Blaw-Knox. To see how this experienced technical

know-how works for you in your own plans for new processes, plant expansion or modernization, contact our engineers.

For a concise survey of Blaw-Knox's complete engineering and construction services for this booming industry, send for Bulletin 2515. Blaw-Knox Company, Chemical Plants Division with production offices in Pittsburgh and Chicago. Branch offices in Birmingham, New York, Haddon Heights, New Jersey, San Francisco and Washington, D.C.

for plants of distinction . . .



Superfine Silica Starts Up in U.S.

Swinging into full production this week is Godfrey L. Cabot, Inc.'s "white carbon black" plant at Tuscola, Ill. Designed to produce 5.6 million lbs./year of a fine, pure-grade silica, the plant is the first in the country to use the process of the German firm Deutsche Gold- und Silber-Scheideanstalt (Degussa).

The plant started up three weeks ago on a limited basis. For this, Cabot purchased silicon tetrachloride (*CW Technology Newsletter*, April 12). This week, it is completing facilities for making its own tetrachloride by the conventional treatment of silicon carbide or ferrosilicon with chlorine. Key step in the process, however, is vaporizing the tetrachloride and burning it with hydrogen. Silica produced is drawn off into cyclones and collected as a fine dust.

Two units of four furnaces each make up the present capacity of the plant. But existing pipelines and many major pieces of equipment are large enough to accommodate four units, allowing a possible capacity expansion to more than 11 million lbs./year.

Long-Term Friendship: Actually, Cabot's association with Degussa goes back to 1950, when the two firms completed a cross-licensing arrangement. As part of that agreement, Cabot obtained rights to produce and sell the silica product developed by Degussa and called Aerosil. Cabot started importing the material in '52, tabbed it Cab-O-Sil in '53. Plans for its own plant were started in '55.

Why Tuscola? Cabot studied many possible locations for its plant, chose Tuscola because of its economic advantages. The new plant site is at one corner of a triangle, with the facilities of U.S. Industrial Chemicals Co. and National Petro-Chemicals Corp. at the other two. Hydrogen for Cabot's operations comes from Petro's complex. By-product hydrogen chloride is absorbed in a stream of weak hydrochloric acid from the USI plant, is returned to USI as strong acid.

Cabot's site also has ample room for expansion. The new plant occupies only 10 of its 75 acres.

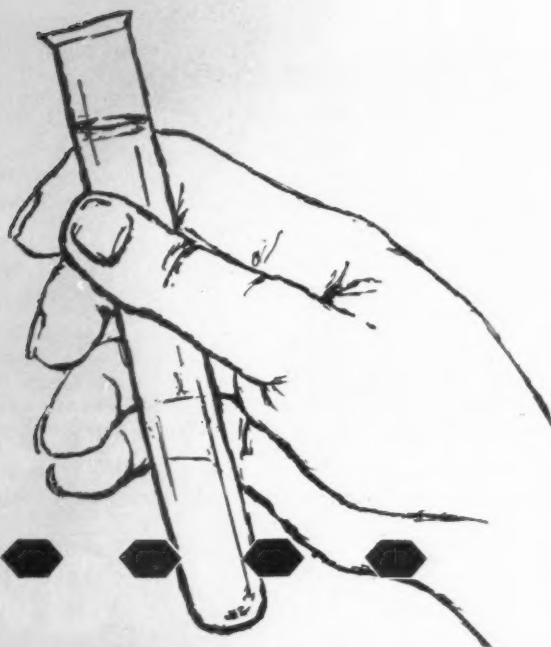
It's in the Method: Cab-O-Sil's favorable properties derive from the processing method used. The extremely fine dust—particle size: 15-20 millimicrons—results from the collection of the silica directly from the vapor phase. Silicas precipitated from aqueous solutions, such as sodium silicate, lack the fine particle size, don't measure up in chemical purity (99-99.7% silicon dioxide), surface area (175-200 sq. meters/gram).

Among the applications in which Cab-O-Sil has proved valuable:

Godfrey L. Cabot's new silica plant at Tuscola.

The emphasis is on

**PURITY
and
UNIFORMITY**



with

DELHI-TAYLOR PETROCHEMICALS

**BENZENE
TOLUENE
XYLENES**

You can depend on Delhi-Taylor Petrochemicals for purity and uniformity to meet the highest industry standards.

Controlled Processing is the reason. Delhi-Taylor's modern petrochemical plant is equipped with the latest process control and instrumentation systems to assure you of highest quality . . . consistently.

You can depend on Delhi-Taylor for service, too. Barge, tank-car and tank truck shipments can be dispatched efficiently from our plant and bulk terminals to meet your processing schedules.

Send today for our new Specifications Folder.



CHEMICAL DIVISION

DELHI-TAYLOR OIL CORPORATION

415 MADISON AVE. • NEW YORK 17, N. Y.

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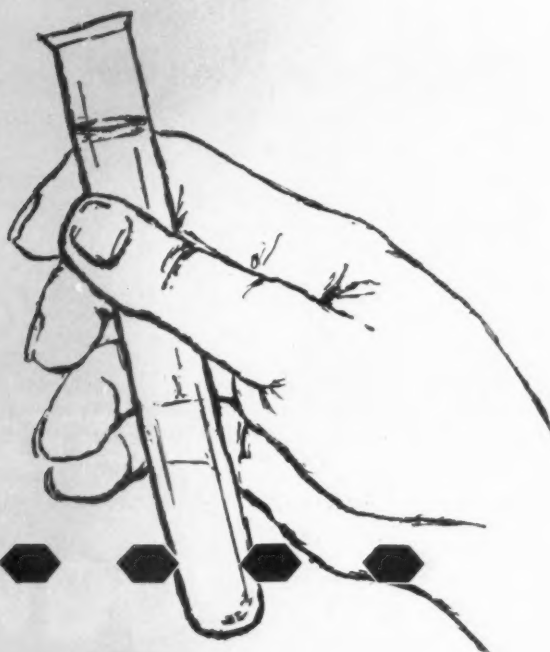
Godfrey L. Cabot's new silica plant at Tuscola.

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Send today for our new Specifications Folder.



CHEMICAL DIVISION

DELHI-TAYLOR OIL CORPORATION

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tolerance: zero parts per million

Vitro Engineering's ability to scope and design safe, productive plants for processing dangerous or difficult-to-handle chemicals is classically illustrated in the nerve gas plant whose central control panel is shown here. Specifications called for zero leakage to personnel areas. Moreover, the interlocking system of instrumentation, controls, leak detection, automatic machinery and remote handling devices had to be designed and built on a crash basis. The crowning glory of this \$90,000,000 complex is a 1200-foot assembly line where casings are cleaned, filled with nerve gas, tested, fused, clustered and prepared for delivery to the combat arms. The 200-foot filling area is molecule-tight.

Like many other Vitro Engineering jobs, no precedent existed for this plant. Yet the nature of the problems encountered in its development did not differ largely from many others Vitro Engineering has solved for the nuclear, chemical, metallurgy and defense fields. It has wrapped blankets of air around large processing areas, imposed negative pressures across sensitive points, designed reactor containment vessels and built isolation laboratories for research in contagious diseases.

If progress leads you into undeveloped technologies or includes plants to manufacture dangerous, corrosive, sterile, high purity, or radioactive materials, call in Vitro Engineering Company.



Engineers to the Atomic Age

Vitro

ENGINEERING COMPANY
DIVISION VITRO CORPORATION OF AMERICA

225 FOURTH AVE., NEW YORK 3, N. Y.

ENGINEERING

- Reinforcing rubber polymers.
- Producing stable lubricating greases.
- Coating reproduction papers.
- Adjusting viscosity of paints and inks.
- Controlling flow properties of a wide variety of industrial powders and liquids.

Cabot says that Cab-O-Sil, because of small particle size and amorphous composition, will not cause silicosis. But the company recommends adequate ventilation and use of dust masks.

Cabot's move in setting up the process in the U.S. shows a good deal of confidence in both the product and process. It feels that there's a good future for the fine white material in applications where even carbon black doesn't quite meet rigid specifications.

Coal Chemicals Boon?

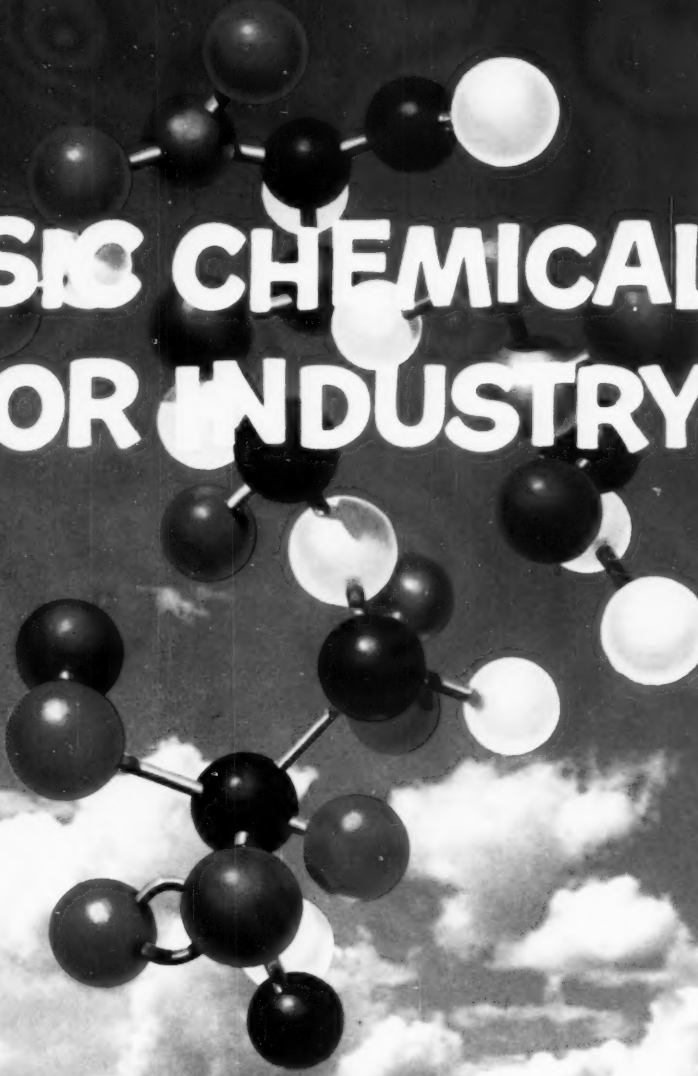
Babcock & Wilcox Co. (New York) has come up with a new char-burning boiler that may prove to be as big a boon to coal chemical producers as to the electrical power industry for which it was developed.

Described by B&W as "a major breakthrough" in the search for ways to reduce fuel costs for power production, the new equipment burns coal-derived low-volatile char—a fuel that can be marketed competitively with raw coal. Its development, adds B&W, makes it economically feasible for coal processors to employ the latest techniques of extracting tars and chemicals from raw coal and to wind up with low-cost, by-product char that can be used economically for power generation.

Other removal processes now in common use produce premium fuels consumed either in the steel industry or as smokeless household fuels. Test burnings of the fine, coke-like char at B&W's Alliance, O., Research and Development Center indicate that it's more difficult to burn than raw coal but has similar heat value.

The first commercial char-burning boiler installation is scheduled for completion this year at Ohio Power Co.'s Kammer Station (Cresap, W. Va.).

The plant will employ three units having a combined steam output of 4,569,000 lbs./hour. The units will be equipped with dual proportional feed-

A complex molecular model is superimposed over the central text. It consists of numerous black and white spheres connected by thin rods, representing a chemical structure. The model is positioned as if it is floating in the air above a landscape.

BASIC CHEMICALS FOR INDUSTRY



ORONITE CHEMICAL COMPANY

A CALIFORNIA CHEMICAL COMPANY SUBSIDIARY

**ORONITE**

Description and application

ALKANE* detergent intermediate

From the early days of synthetic detergents to today's market of well over 3 billion pounds—Oronite ALKANE has remained the world's leading detergent raw material. ALKANE is an alkyl aromatic which is readily converted into the highest quality syndets—liquid or dry, household or industrial.

Oronite is also foremost in providing technical assistance on detergent processing—continuous or batch processing, oleum or SO_3 . Oronite can supply technical assistance and complete information on building or adapting existing plants for the processing of ALKANE. This service includes drawings, flow diagrams and suggested plant equipment as well as technical service on plant operation and product control. Write for technical bulletin giving you the complete ALKANE story.

SURFACE ACTIVE AGENTS

SLURRY. Detergent intermediate in paste form—easily processed into liquids or dry detergents in flake, granule, bead or powder form. Widely used as a wetting agent, emulsifier, emulsion breaker and flotation reagent.

D-40* and D-60*. Dry detergents used "as is" or with builders for cleaning, wetting, dispersing or foaming. Widely employed in household cleansers, washing products, pre-cast concrete products, fire fighting, textile, leather and ore processing, air pollution control and in surface coatings. Available in three particle sizes—granules, flakes and powder. Write for D-40 "use" bulletin.

DISPERSANTS NI-E, NI-O, NI-W. NI-E is an oil-soluble, liquid nonionic used in formulation of dry cleaning detergents and for emulsification applications where a water-in-oil type emulsifier is required. NI-O is slightly more hydrophylic and has similar application. NI-W, liquid nonionic, is used for compounding heavy duty household and industrial detergents, liquid dishwashing products, metal cleaners, sanitizers, rug cleaning, textile and leather processing compounds, agricultural chemicals, insecticides, polishes and cosmetics.

ISOPHTHALIC

This Oronite Chemical Company "first" is proving to be the most important new raw material for the paint and plastics industries in the past half century.

Isophthalic is a white crystalline product similar to phthalic anhydride in appearance but differing markedly in physical properties and reaction characteristics. Isophthalic forms all three types of esters. Simple esters for plasticizers; complex esters for alkyd resins and high molecular weight; linear polymers necessary for films and fibers.

Paint formulas—industrial, interior and exterior architectural paints and baking finishes—developed from Isophthalic-based resins are becoming the talk of the paint industry. Long-sought-after improvements in paints—better color and gloss retention, faster "quick-dry" and "through-dry", superior flexibility, hardness and impact resistance, better resistance to film checking and cracking, excellent non-yellowing properties, better adhesion to metal surfaces, tougher, longer lasting films—all can be obtained from Oronite® Isophthalic.

For plastics—polyesters, polyamides, polyester-amides, reinforced plastics of unsaturated polyester types and for plasticizers—Isophthalic materially improves products as well as presenting opportunities for new products.

There is good evidence that Isophthalic resins produce epoxy strengths at polyester prices. Reinforced plastics, of unsaturated polyester type—that withstand higher temperatures that can resist more flexing, that have greater impact strength, that have better adhesion to glass—are now possible with Oronite Isophthalic. Such a serviceable material, which can meet your cost requirements, opens up new horizons and new applications, as well as offering improvements in present plastics products.

Ask your paint or resin supplier about Isophthalic, or contact any Oronite office and let us prove to you how Isophthalic can benefit your products.

*Trademark Oronite Chemical Company.

of versatile Oronite products

ORONITE



PHENOL, U.S.P.

Oronite as a phenol source offers you two important advantages. (1) Consistent high-quality phenol is assured from the unique cumene manufacturing process. (2) Oronite is the only phenol producer in the U. S. with complete control of raw materials and manufacturing from start to finish—using its own petroleum stocks as raw material. Such a basic source doubly assures you of a most dependable supplier for high quality phenol.

To best serve Eastern and Mid-Western phenol users, Oronite has bulk distribution terminals available at key consuming points. Customers are quickly served by tank car, tank truck or with drum shipments.

Oronite® Phenol is a basic chemical for plastic molding powders, adhesives for the plywood industry, lube oil additives, and as an intermediate for manufacturing other chemicals. Get the Oronite Phenol story.

PHTHALIC ANHYDRIDE

In 1945, Oronite Chemical Company began the world's first production of phthalic anhydride from ortho-xylene, a petroleum derivative. Through the years Oronite® phthalic anhydride has been considered the standard of quality in alkyd and polyester resin manufacture, in plasticizer production and in organic synthesis. And because of Oronite's affiliation with one of the world's largest producing and refining oil companies—petroleum stocks are always in assured supply for production of phthalic anhydride.

Quick delivery of Oronite phthalic anhydride, in molten or flake form, is made from bulk storage terminals in close-by Eastern and Mid-Western centers. Oronite phthalic anhydride is a basic ingredient in paints, plastics, pigments and a host of other products, and Oronite is the sole supplier of petroleum-derived P.A.

POLYBUTENES

Oronite® polybutenes are synthetic polymers, chemically inert liquids nearly water white in color. They are available in seven different grades, varying from moderate to very high viscosity and tackiness. They do not become gummy or waxy and do not harden, darken or change in any essential property over long periods of atmospheric exposure. Ideally suited in preparation of sound deadening, insulation and calking compounds; as a dielectric in high voltage cables, condensers and capacitors; as an ingredient in the manufacture of pressure sensitive adhesives and leather goods. Write for technical data; product samples are also available.

XYLENE INTERMEDIATES

Meta-Xylene 95%—Para-Xylene 98%—Ortho-Xylene. Oronite was the pioneer and is today the leading producer of xylene isomers — the only source offering all three isomers in commercial quantities. *Meta-Xylene* offers many opportunities in the production of pharmaceuticals, dyestuffs, polyesters, perfume ingredients and fine chemicals. *Para-Xylene* is used as an intermediate to manufacture synthetic fibers and films. *Ortho-Xylene* is used as an intermediate for making phthalic anhydride and other chemicals. Write for further information on properties and data on typical tests.

ACETONE

Oronite cumene process Acetone is a colorless, fragrant, flammable liquid that more than complies with the ASTM requirements. Used as a vehicle in nitro-cellulose lacquers, varnishes, rubber cements and in the manufacture of rayon, celluloid and cellulose acetate plastics. Also a solvent, cleaning agent and extracting medium. Purity is 99.5% minimum; typically 99.8%.

GAS ODORANTS

Oronite manufactures and markets a complete line of odorants to meet all safety requirements of the natural and liquefied petroleum gas industries. Since marketing of the first gas odorant in 1927, Oronite has been a major producer and leader in gas odorization. Oronite odorants include: Calodorant® C, a completely stable cyclic sulfide odorant; Calodorant® C Special, blend of Calodorant C and solvent; Calodorant® B-1 and the new Calodorant® F, sulfide odorants at mercaptan prices; Alert® 80, best economy-priced, quality mercaptan; Ethyl Mercaptan, a high quality pure mercaptan for LP gas; LPG odorant, tailor-made from a selected mercaptan cut. Send for Oronite's comprehensive Gas Odorant technical bulletin.

LUBE OIL ADDITIVES

Oronite is considered the preferred source for oil and grease additives which reduce wear and increase performance of aircraft, gasoline or diesel driven automotive equipment. Oronite will formulate to a customer's exact needs and specifications; will provide "complete-performance" formulations, or will furnish special performance additives.

Various Oronite additives improve base oils by providing: detergent-dispersion action, resistance to oxidation, rust and corrosion protection. They give reduced engine wear and cleanliness under low temperature operation. New Oronite "60" Series additives are specially designed for today's high-powered gasoline engines and "stop" and "start" driving conditions. Other advanced Oronite additive products include a new automatic transmission fluid and a new gelling agent for producing superior grease lubricants.

The research and testing facilities behind Oronite additives are the most advanced in the nation. A leading manufacturer of petrochemicals, Oronite has the experience and facilities in oils and chemicals to consistently produce the finest additive products—assuring you dependability, maximum performance and fair prices. It will pay you to get the Oronite additive story.

HIGH TEMPERATURE HYDRAULIC FLUIDS

After several years of research and development, Oronite is now offering high temperature hydraulic fluids 8515 and 8200. These non-petroleum based silicate ester fluids are finding wide acceptance in supersonic aircraft and missile applications. Low vapor pressure and constant viscosity in addition to desirable electrical properties indicate many potential uses in other applications. Contact any Oronite office for additional information and the new technical bulletin.

OTHER ORONITE PRODUCTS

Butadiene. Polymerization grade, 98% minimum purity. Used as component in certain synthetic rubbers and latices.

Fuel Oil Additives. Mixed with diesel, furnace and jet oil fuels to stabilize against deterioration, sludge formation and for preventing corrosion in presence of water.

Maleic Anhydride. White crystalline product used in manufacture of synthetic resins, paints, dyes and plastics.

Metallic Naphthenates. Used as preservatives for cellulose products against attacks of bacteria, fungi, wood parasites and marine organisms.

Hydrogenation Catalyst. Used in de-sulfurization process to remove sulfur, nitrogen and metals from petroleum feed stocks.

TECHNICAL ASSISTANCE. Oronite's philosophy on technical service is that of translating product research data to your individual needs. Oronite recognizes that each raw material application is different but that helpful supplementary assistance can be provided on an individual basis. When a company becomes an Oronite customer, technical service continues—providing the customer new data as developed, suggesting ways of cutting costs, cooperating in every way possible to make your association with Oronite more valuable. Why not call Oronite and see for yourself the depth of our technical assistance on your problems. Our wide experience as a leading petrochemical source is at your disposal.



ORONITE CHEMICAL COMPANY

A CALIFORNIA CHEMICAL COMPANY SUBSIDIARY

EXECUTIVE OFFICES • 200 Bush Street, San Francisco 20, California

SALES OFFICES • New York, Boston, Wilmington, Chicago, Cincinnati, Cleveland, Houston, Tulsa, Los Angeles, San Francisco, Seattle

Foreign Affiliate: California Chemical International, Inc., San Francisco, Geneva, Panama

ENGINEERING

ers capable of firing 100% coal, 100% char, or any proportion of the two.

Char will be supplied by Pittsburgh Consolidation Coal Co.'s \$25-million processing plant, which will extract chemicals from coal produced at its new 3-million-tons/year mine nearby. A major share of the 675,000 kw. of electrical power generated in the Kammer Station will be used to operate the aluminum reduction plant being built a short distance down the Ohio River by Ormet Corp. (joint subsidiary of Olin Mathieson and Revere Copper & Brass), which owns two of the station's char-burning boilers.

PROCESSES

Dry-Coloring Plastics: The Polymer Chemicals Division of W. R. Grace & Co. has developed a new dry-coloring process for injection molding of thermoplastic resins. Complete dispersion of dry colorants by the new method is gained by using an inexpensive, single-breaker plate that can be constructed by simple machining to fit existing nozzles. Preparation of colored mixtures for injection molding or extrusion consists of tumbling together the plastic resin and colorant (micropulverized colorants are recommended) for 30-45 minutes without wetting agents or lubricants. Color dispersion provided by this technique, says Grace, is equal to or better than some compounded colors, can be achieved at savings of 65% or more.

Shale Oil Project: The Texas Co. has initiated a multimillion-dollar program to find a new approach to recovery of hundreds of billions of barrels of oil that's contained in the shales of eastern Utah, western Colorado and southwestern Wyoming. The company has acquired a 25-acre tract in Salt Lake City on which it will construct a shale oil research laboratory, probably sometime in '59.

Ultrahard Machining: Commercial prospects of ultrahard metals for aircraft and missiles applications may hinge on the outcome of a new program to develop fast, efficient machining techniques. Such metals as cobalt, nickel, molybdenum and titanium-base alloys withstand temperatures encountered in high-speed flight (800-1800 F), and have desirable strength-to-weight ratios. But they're extremely



NEW POLYMERS
with
"Tailored" properties

can be created
by the use of
precisely controlled
ionizing radiation
delivered by the
Van de Graaff®
PARTICLE ACCELERATOR

*With this powerful, efficient,
versatile, and safe machine, you can*

- irradiate liquids, gases, solids, powders, and sponges
- process materials in trays, pipes, rolls, sheets, or bottles
- use either scanned or concentrated electron beam or x-rays
- control voltage and current through a wide range with automatic dosage monitoring

At low capital cost, the new, Model GS 1.5-Mev Van de Graaff delivers peak power up to five kilowatts — meeting today's need for in-line processing and providing for a wide variety of experimental and production uses. Write for Bulletin G.

You can experiment with radiation processing at our rental facility. Bulletin F, free on request, will give you the details.



HIGH VOLTAGE ENGINEERING

CORPORATION

BURLINGTON

MASSACHUSETTS

new perspectives
in alkali metal salts



Now! RUBIDIUM and CESIUM SALTS available for evaluation

American Potash & Chemical Corporation—basic in the salts of all five alkali metals—now offers Rubidium and Cesium salts at substantially reduced prices. Immediate availability of these interesting compounds... most highly reactive of the alkali metals... permits their evaluation for wider industrial use. We offer the following compounds for your consideration:

RUBIDIUM:

Carbonate (Rb_2CO_3);
Sulphate (Rb_2SO_4);
Chloride (RbCl);
Fluoride (RbF).

CESIUM:

Carbonate (Cs_2CO_3);
Sulphate (Cs_2SO_4);
Chloride (CsCl);
Fluoride (CsF).



For further information
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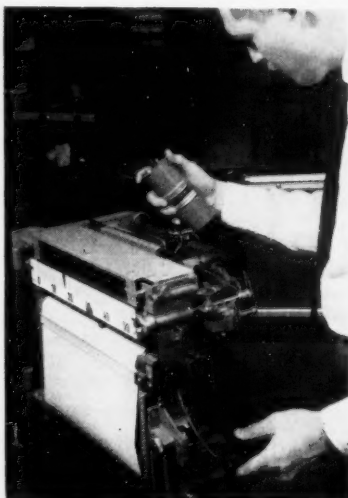
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ENGINEERING

difficult to machine, require slow cutting speeds (65-100 surface ft./minute), precluding economic, high-rate production. To break this machining bottleneck, Manufacturing Methods Branch of Air Materiel Command has awarded Lockheed Aircraft Co. a contract to study all known high-speed metal-cutting methods, to investigate effects of machining these materials at 50,000-162,000 surface ft./minute.

New Battery Design: National Carbon Co. (New York) has developed a method of assembling radio batteries that offers new practicality to portable transistor radios. By redesigning the zinc anode and cathode elements, National Carbon can pack more elements into a given volume. This allows radio makers more flexibility in designing sets using semiconductor transistors.



Outdating the Dry Cell?

Instrument engineers now have a new way to supply the constant reference voltage necessary for the operation of electrically actuated instruments. The engineer above is shown replacing a dry-cell battery (the voltage reference supply) with Performance Measurements Co.'s (Detroit) CVR-10—a unit that plugs into the 115-v. supply line. Performance Measurements says that by replacing the dry cells with the new units (which have the dimensions of the batteries and require no equipment modifications), battery replacement and maintenance can be eliminated.

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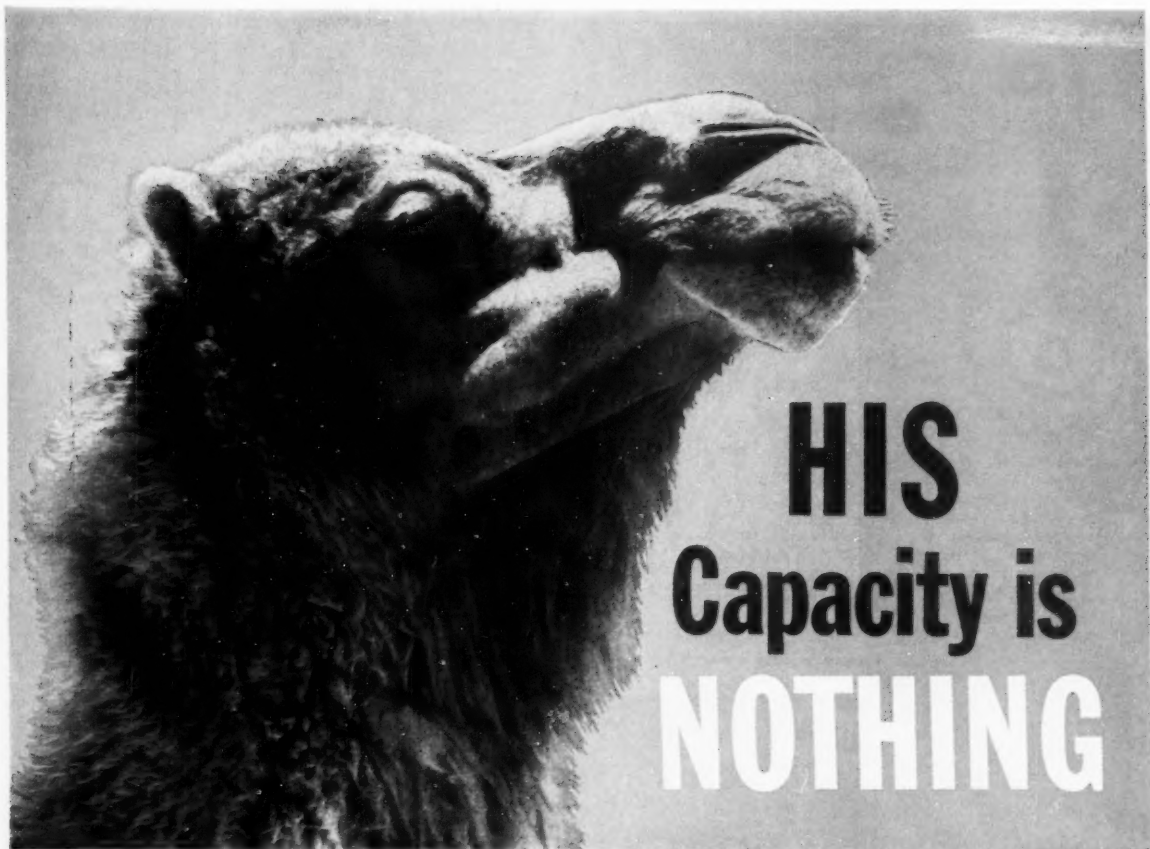
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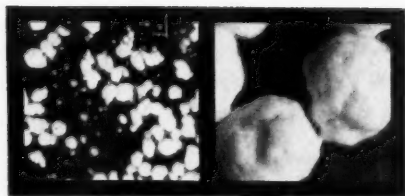
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| <p>1952</p> <p>First Dr. Ivan W. Brown, Jr. Duke University School of Medicine and Rev. Basile J. Luyet Institute of Biophysics, St. Louis University</p> <p>Second Dr. Raymond Reiser and Dr. Hermann Schlenk Texas Agricultural Experiment Station</p> <p>Third Research team at Southern Regional Research Laboratory headed by Dr. Reuben O. Feuge</p> | <p>1953</p> <p>First Dr. Erich Baer University of Toronto</p> <p>Second Dr. Lewis I. Gidez Brookhaven National Laboratory and Dr. Manfred L. Karnovsky Harvard Medical School</p> <p>Third Albert C. Nuessle Rohm & Haas and Russell F. Crawford, Jr. Sharon Hill, Pa.</p> | |
| <p>1954</p> <p>First Prof. Robert K. Summerbell Northwestern University and Dr. James R. Stephens American Cyanamid Co.</p> <p>Second Two research teams: Dr. Robert W. Swick and Akira Kakao of Argonne National Laboratory and Dr. Harland G. Wood and Dr. Per Schambye of Western Reserve University</p> <p>Third Dr. Henry A. Sloviter University of Pennsylvania</p> |  <p><i>First Award... for outstanding research accomplishment in the application of Glycerine or Glycerine derivatives</i></p> <p>1958</p> <p>GLYCERINE PRODUCERS' ASSOCIATION</p> | <p>1955</p> <p>First Dr. Reed A. Gray Merck & Co.</p> <p>Second Dr. Eugene P. Kennedy University of Chicago</p> <p>Third Dr. Karl H. Lauer University of Alabama</p> |
| <p>1956</p> <p>First Dr. Herbert J. Dutton, U. S. Dept. of Agriculture</p> <p>Second Dr. Donald Zilversmit, University of Tennessee</p> <p>Third Dr. Stanley G. Knight, University of Wisconsin</p> | | <p>1957</p> <p>First Dr. James L. Tullis, Harvard Medical School</p> <p>Second Guido V. Marinetti, University of Rochester</p> <p>Third C. G. Youngs and Henry R. Sallans, National Research Council of Canada</p> |

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BASIS OF ENTRY—These awards are open to any individual in the United States or Canada engaged in research, either in industry or with government or educational institutions. Entries by research teams of two or three associates are eligible.

First consideration will be given to work which has come

to a clear-cut point of accomplishment during the current year; but work carried on in previous years, the significance of which has been confirmed by commercial application in 1958, also will be eligible.

Entries will be judged by a committee of three persons of outstanding reputation and scientific background, having no connection with the Association or its members.

METHOD OF NOMINATION—Nominations must be made on the official entry blank, which may be obtained by writing to: Awards Committee, Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.

All nominations for the 1958 awards must be received by November 1, 1958 to be eligible.

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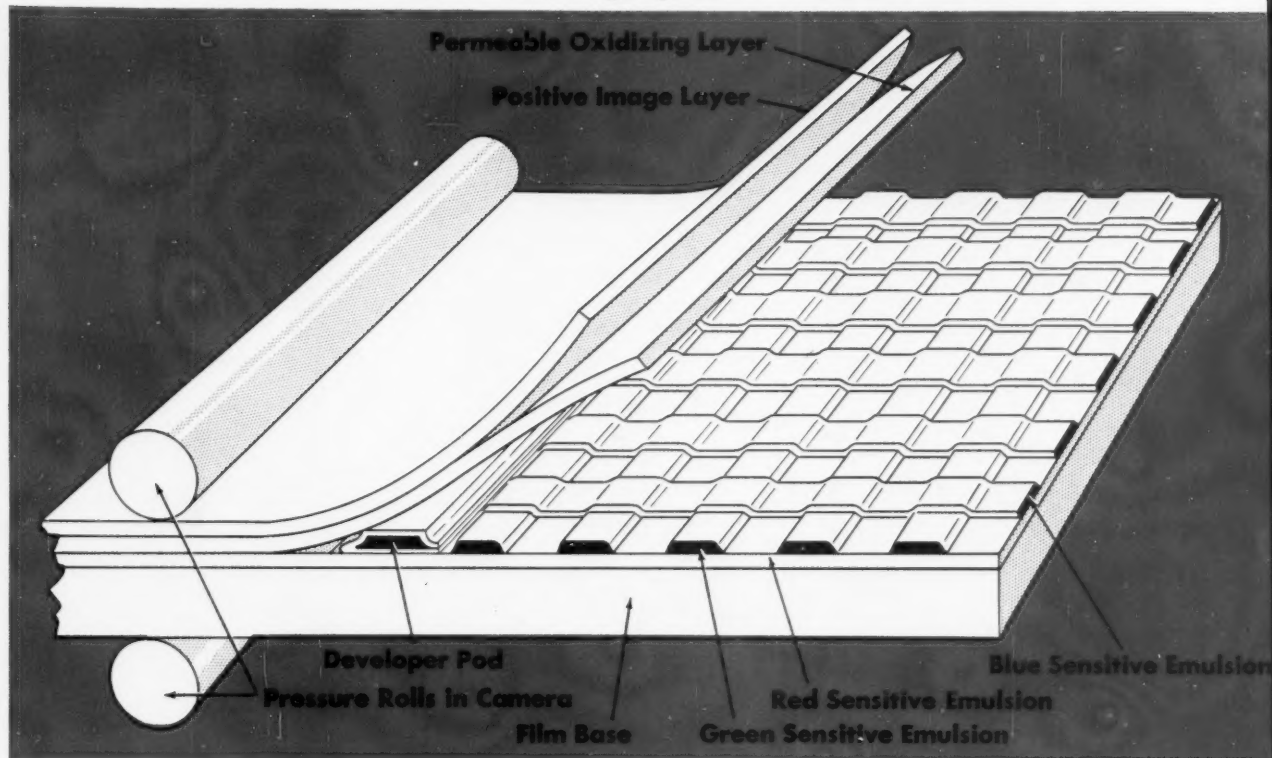
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RESEARCH

New Film Turns Out Color Photographs in Three Minutes



Developing a \$228-Million Film Market

As Polaroid Corp. (Cambridge, Mass.) this week rushes to perfect techniques of producing its new color film—"color picture in three minutes" (above)—makers of conventional photo films are stepping up their own color research to meet the challenge.

General Aniline & Film's Ansco Division reveals that more than 50% of its research is now aimed at better and cheaper color film, with emphasis on highly light-sensitive varieties. And leading U.S. producer Eastman Kodak is pushing improvements in its system to make positive color prints from color negatives. (Eastman, however, is also helping Polaroid, expects to eventually supply the color-film chemicals.)

At stake is a big and growing market—\$228 million worth of color film, \$22.5 million for processing chemicals (both figures U.S., retail). It's a market that could burgeon

further if Polaroid's venture into color becomes a commercial success.

Polaroid's Problem: But before Polaroid can add to the volume of color-film sales, it has a number of problems to overcome. The complexity of making quick-developing color film is outlined in Polaroid's recent Australian patent application No. 24585, a 99-page document that relates "to a one-step photographic process for forming multicolor images, and to film units for carrying out said process, as well as to photo-sensitive elements useful in said film elements."

Polaroid's color film, designed for use in the Land Camera, takes three minutes to develop after exposure, triple the time required for similar black-and-white pictures. Chemically (and in manufacture), the new film is much more complicated than conventional color film. It's comprised

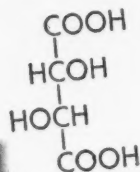
of a film base, three layers of color (red, green, blue) emulsion (separated by a thin film of cellulose nitrate or partly hydrolyzed polyvinyl acetate), a pod of liquid chemical "activator," and a positive image receiver with attached oxidizing layer (see drawing above).

After the exposure is made, the film is pulled from behind the lens (to the left, above), bringing the positive and negative layers together and breaking the chemical pod. The pod's contents spread over the negative layer (the waffle-patterned part), diffusing into the three color emulsions (designed as a screen having 250 lines to the inch) and dissolving and activating the developer, which has been "built into" the emulsion layers. The pod contains sodium carboxymethyl cellulose, sodium hydroxide and water. All three color layers contain 2-amino-5-diethylaminotoluene monohydrochloride

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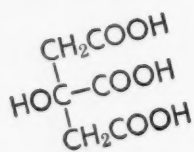
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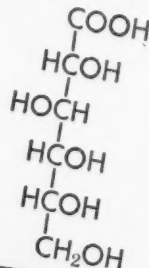
Non-toxic—excellent sequesterant—one of the most versatile of industrial organic acids—several esters gaining reputation as efficient, non-toxic plasticizers.



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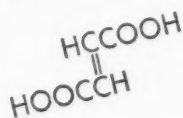
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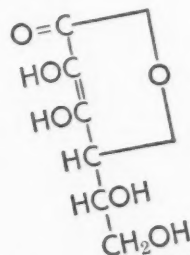
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RESEARCH

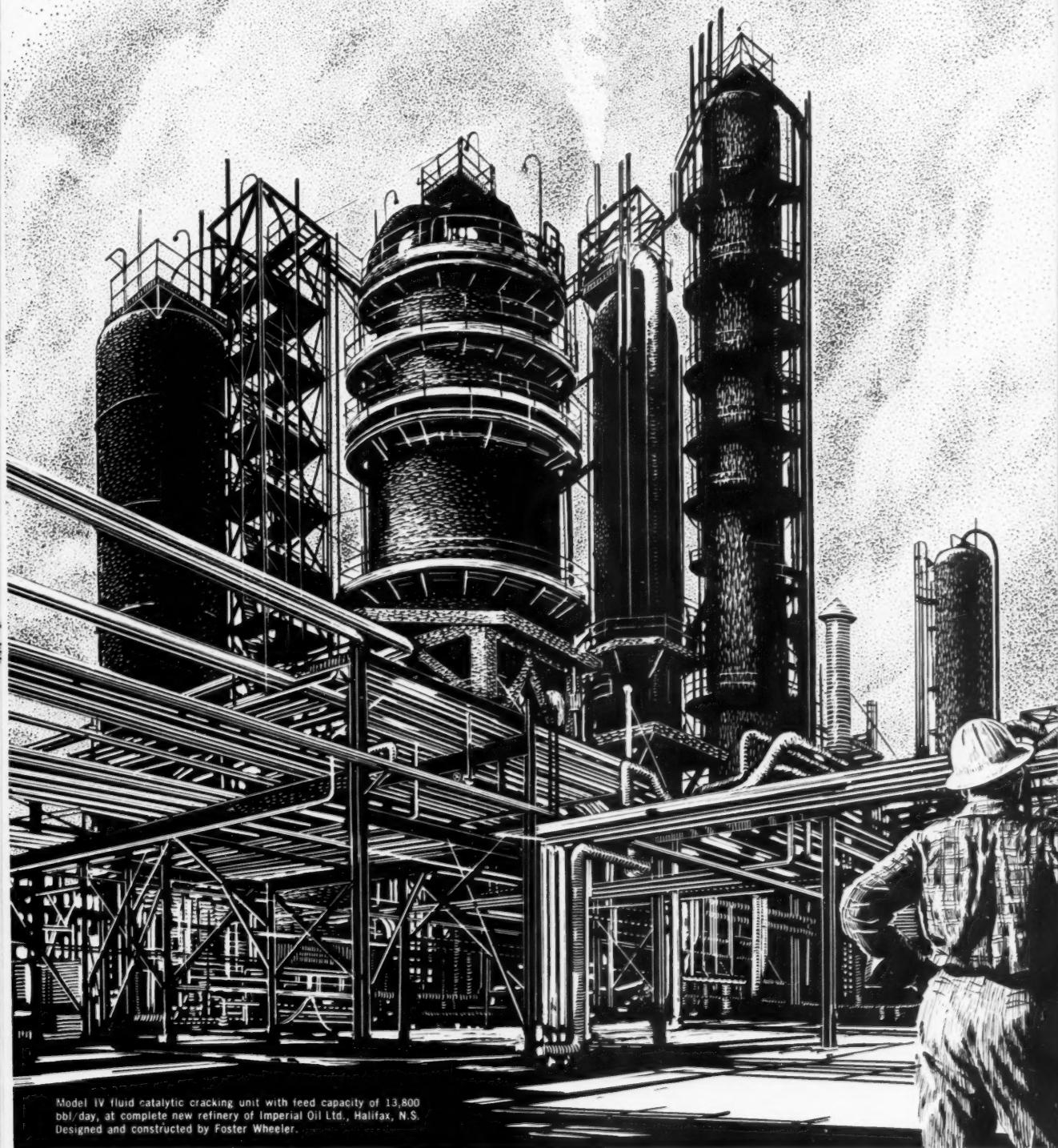
as a developing agent, along with sodium hydroxide, triphenyl phosphate and silver halide; alkyl lauryl sulfate as an emulsifier; gelatin as a base. In addition, each layer has coupling agents: 2,4-dichloro-1-naphthol for red; *p*-nitro-phenylacetonitrile for green; aceto-2-chloranilide for blue.

The dissolved developer reacts with the silver halide, a portion becoming oxidized as the halide is reduced to silver. This oxidized developer then reacts with coupling agents to make an immobile dye within each layer. Unreacted developer and coupler diffuse back through the pod solution into the oxidizing layer, where polyvalent metallic oxidizing agents such as cupric sulfate, chlorate or acetate cause reduction of the "leftover" developer, which then combines with the leftover coupler. The resulting positive dye stains the image-forming paper, which may be Baryta paper (dye transfer paper), regenerated cellulose, or certain types of nylon supported by any conventional film base.

Keeping Pace: Eastman Kodak (Rochester, N.Y.) is shifting its color research emphasis from the reversal system (for making color transparencies) to the newer negative-positive system (which produces a color negative from which color prints, black-and-white prints and color transparencies may be made). Cyril Staud, Kodak's vice-president of research and development, tells *CW* the negative-positive system, with its diversified uses, "in some areas offers more future for color photography" than reversal films. This week, Kodak embarked on a national campaign to sell photo dealers and their customers the advantages of the system. The firm is looking for new color couplers, developers to improve the negative-positive system. Its research in color photography hasn't been affected by the current business climate. Staud explains: "Experience has shown that the public continues to take more pictures every year. Our research is aimed at cutting the cost of film and processing chemicals to spur film use."

His firm is also working with Du Pont's Cronar polyester film base (on license), which can be made thinner and stronger than conventional acetate film base. Du Pont says it is "interested" in color film but is doing no research on it while changing over to

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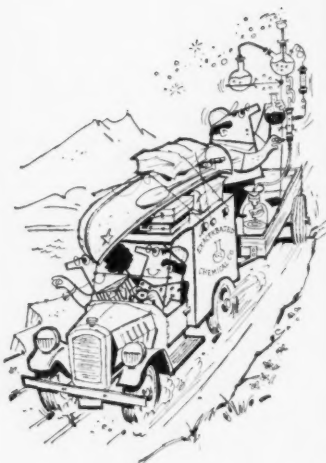
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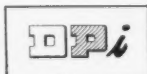
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RESEARCH

Cronar for its line of photo film.

GAF's Ansco Division (Binghamton, N.Y.) is out with new varieties of high-speed reversal-type film called Super Anscochrome. A somewhat slower version of this film first appeared in 1955. The same year, Kodak launched its competitive Ektachrome. Ansco claims Super Anscochrome film is 10 times more light-sensitive than Eastman's Kodachrome, thrice as sensitive as Ektachrome. H. Duerr, Ansco's technical director of research and development, thinks research on film quality is highly important to stave off foreign competition. But foreign film manufacturers haven't encroached much on the U.S. color-film market (*CW*, July 13, p. 32). Gaevent (Belgium) is currently selling no color film in the U.S. but says it will market both negative-positive and reversal-type color films later this year. Ferrani (Italy) sells a reversal film in Europe but not in the U.S. Nor does it plan to. That's true



New Cryogenics Tool

Accurate measurement of temperatures near absolute zero is said to be possible with this tiny new germanium resistance thermometer developed at Bell Telephone Laboratories (New York). A number of the thermometers now being tested for applications in low-temperature research show high sensitivity and stability, have not required frequent calibration. If they're found to have wide usefulness, Bell Labs will offer them to a manufacturer for the commercial market.

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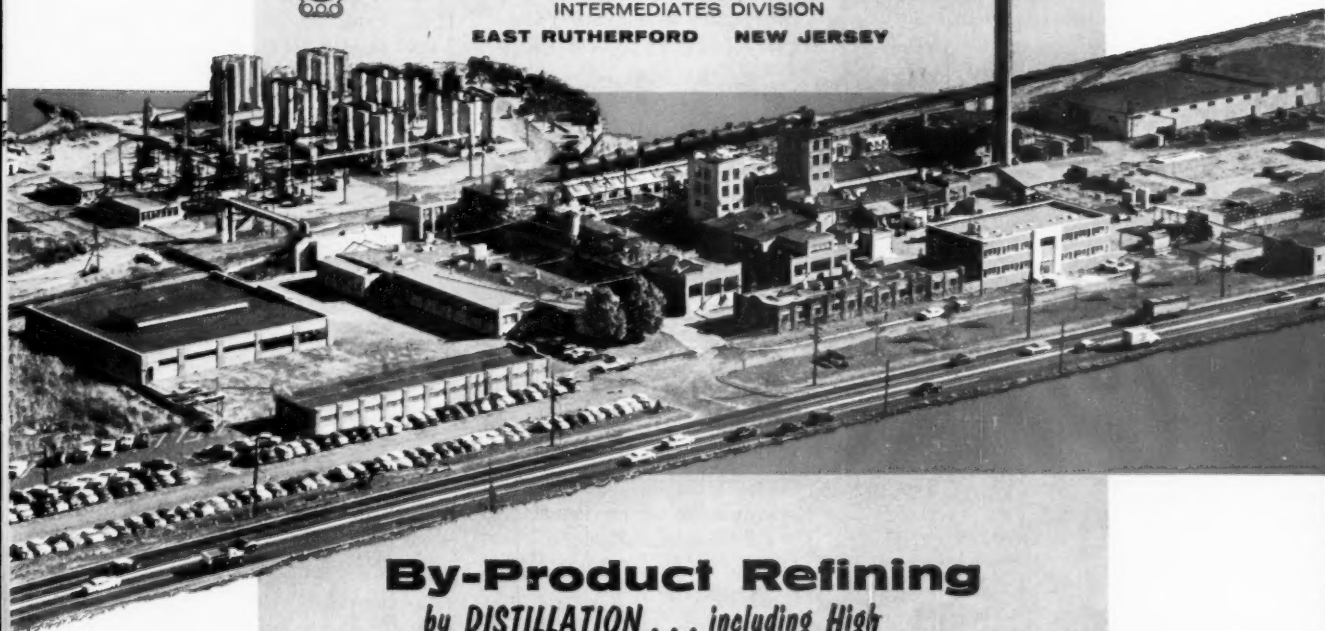
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| BUTYROYL CHLORIDE | PHENYLACETYL CHLORIDE |
| n-CAPROIC ACID | PHENYL PROPYL ALCOHOL |
| CAPROYL CHLORIDE | PHENYL PROPYL CHLORIDE |
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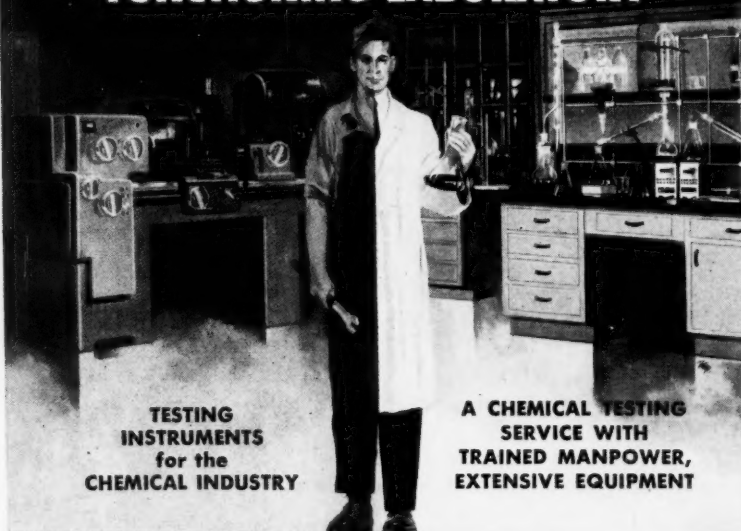
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RESEARCH

also of Ilford, Ltd. (Great Britain), and Perutz (Germany). Agfa, another German concern, previously closely allied with Ansco, tells *CW* it will introduce a negative-positive film to the U.S. in May or June. Adox (Germany) reports no expected U.S. distribution of its negative-positive film.

Meanwhile, 42 million amateur photographers in the U.S. are giving film makers greater incentive to speed research. Better and cheaper color film won't go begging for a market.

EXPANSION

- Reynolds Metals Co. has a new chemical and new-products research lab and pilot plant in Richmond, Va. Personnel will be moved from the Louisville, Ky., lab.

- American Marietta Co. (Chicago) will turn the spade this month on its new \$1-million Synthetic Resins Research Center at Seattle, Wash. Basic and applied research on urea, melamine, phenolic, specialty resins and protein adhesives will be carried on there.

- The Texas Co. (New York) plans a shale oil research laboratory at Salt Lake City. Cost: "several millions."

- Magnolia Petroleum Co. (Dallas) has opened its new chemical and general research lab at Duncanville, Tex.

- Foster D. Snell Inc. (Cambridge, Mass.) has expanded its facilities for testing lubricants, greases, oil, hydraulic fluids. New tests include: water resistance of lubricating greases, apparent viscosity of lube greases, evaporation of oils and greases, and steam emulsion number of lube oils.

PRODUCTS

- **Novel Alcohols:** Du Pont is out with a new series of fluorine-containing alcohols that reportedly show promise as intermediates for new plastics, lubricants, surface-active agents, etc. They're priced at \$30/lb.

- **Dielectric Gas:** Du Pont now offers experimental quantities of octafluorocyclobutane as an insulating gas in electrical equipment. The company says it has an edge over sulfur hexafluoride at high voltages. The new gas is colorless, odorless and nonflammable.

- **Better Rubber:** A new synthetic rubber called MD 551 (*CW*, July 27,

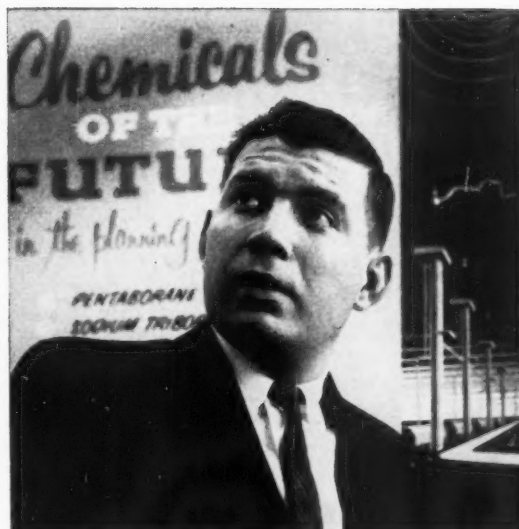
C. J. Wiley suggests some interesting properties and applications of
TRIETHYLBORANE (C_2H_5)₃B
and other TRIALKYL BORANES

"a colorless, liquid organoboron compound, Triethylborane has been found most useful as a polymerization catalyst"

- Q.** Mr. Wiley, what is the current major interest in Triethylborane?
- A.** The biggest potential for this compound lies in its use as a catalyst. It promotes polymerization of unsaturated monomers such as olefins, styrene, acrylonitrile, and acrylic and vinyl compounds.
- Q.** Can Triethylborane be used as a jet fuel?
- A.** Yes, because of its high flame speed, wide range of flammability, and high blow-out velocity.
- Q.** Are the Trialkyl Boranes stable in water?
- A.** The hydrolytic stability is very good in neutral, acid, and alkaline solutions.
- Q.** How stable are they in other media?
- A.** Oxidizing agents, including air, must be avoided, but otherwise boron-carbon bonds are very stable.



- Q.** What are the general solubility characteristics of Triethylborane?
- A.** Triethylborane and the higher Trialkyl Boranes are generally soluble in hydrocarbons, insoluble in water, and miscible with most organic solvents.
- Q.** Is it true that the higher Trialkyl Boranes are less pyrophoric than the Trimethyl and Triethyl compounds?
- A.** Yes. Pyrophoricity decreases as the molecular weight of the hydrocarbon group increases.



C. J. Wiley, A.B., University of Pennsylvania, M.S., University of Massachusetts, Marketing Division, Callery Chemical Company

- Q.** What Alkyl Boranes do you expect to offer?
- A.** Right now, we can supply research quantities of Triethylborane and very soon will have samples of Tributylborane available. Plant flexibility at our new Lawrence, Kansas, plant, now under construction, will eventually permit us to produce a variety of Trialkyl Boranes. Meanwhile, we would be pleased to work with you to help develop any promising applications that you are now studying.
- Q.** Are there any unusual aspects of Trialkyl Boranes that deserve attention?
- A.** Triethylborane and Sodium Hydride form a liquid adduct which should have some very interesting catalytic properties. Trialkyl Boranes synthesized from Diborane and terminal olefins can be oxidized to produce primary alcohols.
- Q.** Do you know of any other useful derivatives of the Trialkyl Boranes?
- A.** Some of the amine complexes of Trialkyl Boranes have been patented as diesel oil additives. They serve as cetane improvers presumably because they increase the flame speed of the fuel-air mixture. The complexes with higher amines should have the corrosion and sludge inhibition properties associated with these amines.



Write or phone for specific information on Triethylborane or any of the other Alkyl Boranes.

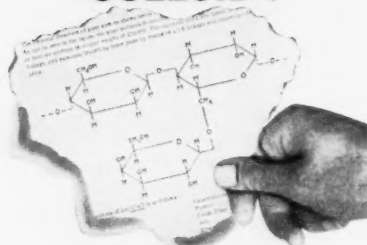


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CALLERY

CHEMICAL COMPANY
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Please send me at once 16-page descriptive booklet together with FREE sample of Stein-Hall's **JAGUAR**. I understand that absolutely no obligation is incurred.

Name
Title
Company
Address
City Zone State

RESEARCH

'57, p. 84) looks so well in tests, according to Esso Research and Engineering Co., that the capacity of its 1-ton/day pilot plant at Baton Rouge may be tripled. The elastomer is expected to find markets in truck tires, steam hose, wire insulation and other applications.

Thermosetting Acrylic: Interchemical Corp.'s Finishes Division (Newark, N. J.) is out with Vitrilan, a new thermosetting acrylic finish. Features include resistance to soaps and detergents, good color retention, corrosion- and stain-resistance.

Serum Enhancer: Glucosamide hydrochloride is now available in "larger than lab quantities" from Mann Research Laboratories Inc. (New York). Suggested use: to enhance antibiotic serums.

Driers: Russian scientists are reported to have developed siccatives (drying agents) consisting of vinyl esters of fatty acids polymerized with wood oil or other unsaturated fat.

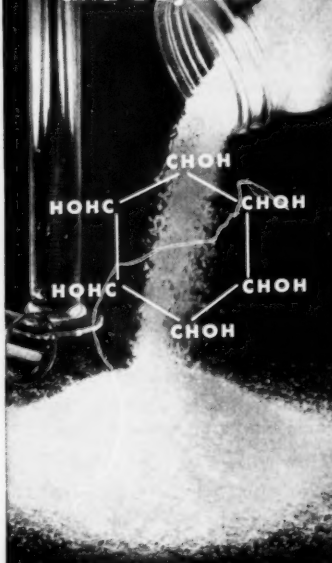


Updated Fuel Cell

National Carbon will show off this latest model of its experimental fuel cell this week at the Brussels World Fair. The unit, examined here by Clarence Larson, research vice-president, is the most efficient cell of its kind the firm has made. It operates on hydrogen gas and the oxygen in air instead of pure oxygen.

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and Soybeans



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Inositol U.S.P. is a product that holds great promise, not only for medicine, but for many fields of industry.

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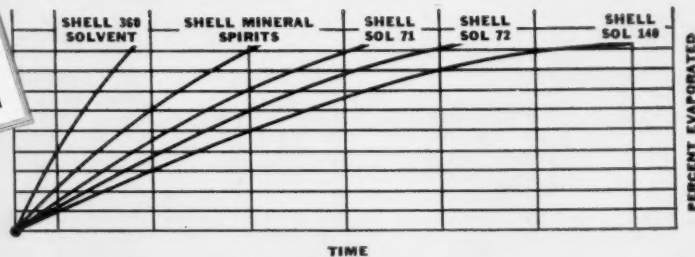
For example, just drop us a line, and an experienced Becco technical representative will call on you at your convenience, to discuss any process to which peroxygen chemicals are applicable. In addition, our staff of chemists and engineers is at your service to assist in any development work necessary. Finally, over 80 informative technical bulletins have been prepared and are yours for the asking — write us for the complete list. At the same time, ask to have our publication, BECCO ECHO, mailed to you regularly — it contains a wealth of information on peroxygen compounds. Address:

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Typical properties of these Shell Solvents are contained in booklet shown. It will be mailed on request.

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... have no odor, are ideal for interior finishes, polishes and cleaners. Shell Sol 71 offers slightly faster evaporation.

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SHELL SOL 140

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Technology

Newsletter

CHEMICAL WEEK

April 19, 1958

Crystalline polyvinyl alcohol was disclosed this week at the 133rd national meeting of the American Chemical Society in San Francisco by researchers of Diamond Alkali's Painesville, O., laboratories. Unlike the common randomly oriented polymer, the new PVA is insoluble in hot water. It's derived from stereospecific polyvinyl monochloroacetate synthesized by a novel process. Key: polymerization is initiated by free-radical sources rather than organometallic complexes.

Other developments highlighted at the week-long ACS conference:

- An ignition retardant that may make borane fuels—which tend to ignite spontaneously—safer to handle in the future. Research at Rensselaer Polytechnic Institute (Troy, N. Y.) indicates that the temperature required to ignite a borane-oxygen mixture can be raised appreciably by a low concentration of iron carbonyl.

- Hinderin is the name of the first synthetic chemical designed to curb overactive thyroid glands. It has been synthesized at University of Southern California but has not yet been tested on either humans or animals.

- Progress in research on the treatment of radiostrontium poisoning was reported by Argonne National Laboratory's Arthur Lindenbaum. In tests using strontium-85 in place of the deadly strontium-90, it was found that sodium or potassium salts of either rhodizonic acid or tetrahydroxyquinone aid in removal of strontium from the body. These compounds markedly decrease strontium concentration in the bones.

And Eric Fowler, of Los Alamos Scientific laboratories, described an effective method of reducing radioactive contamination of food crops by adding lime to the soil. Results of Project Green Thumb, Fowler reports, show that a high concentration of calcium (from ½ to 1 lb./cu. ft. of soil) causes a sharp decrease in the amount of strontium-90 taken from the soil by such plants as lettuce and alfalfa.

•
The Shippingport, Pa., reactor has proved sufficiently reliable to permit firm scheduling of atomic power during shutdowns of conventional generating equipment. Duquesne Light Co. last week reported that the reactor took over for one of its larger generating units during late February and early March, that operations at the nuclear plant have been exceptionally smooth so far.

•
A novel gaseous diffusion membrane of undisclosed composition is believed key to the uranium separation plant soon to be built by France's atomic energy commission (CEA). The new material is currently being tested in an experimental pilot plant constructed last year at the Saclay atomic center (near Paris). It's reported to be as effective as ceramic membranes, but a good deal cheaper. Other materials tested:

Technology

Newsletter

(Continued)

a microporous ceramic (probably aluminum oxide), Teflon, pure nickel.

CEA is planning a large-scale diffusion plant capable of handling 500 tons of natural uranium, will decide on a site sometime in July. It will employ the diffusion process developed independently by the Saclay organization's 31-year-old George Besse. Target date for startup of U-235 production is around 1961-62; cost of the facility, about \$60 million.

Although France can import U-235 from the U.S. (present French order is 2,500 kg. of enriched U-235, selling for \$15-16/gram) this material is restricted to industrial and other nonmilitary uses. The French defense ministry's interest in a domestic supply for military use was apparently the main reason for France's decision to make U-235. The plan was opposed—largely on cost considerations—by many officials of CEA and the French National Assembly and by most other Euratom nations. Only Euratom country planning to cooperate is Italy, which reportedly will help to finance the diffusion project in return for 5-10% of the annual U-235 output.

The radiation inhibitor, AET (2-aminoethylisothiuronium bromide hydrobromide), is now available in limited quantities from Abbott Laboratories (North Chicago, Ill.). AET protects animals against X-radiation (*CW*, 19, '57, p. 69), is being cautiously tested with humans.

Improvements in carbonate extraction of uranium-phosphate minerals are claimed for new separation procedure developed by Deutsche Gold- und Silber-Scheideanstalt (Frankfurt, Germany). Key to the method's efficiency is addition of magnesium and ammonium salts, which tie up other impurities such as silica and colloidal iron hydroxide by forming a complex magnesium-ammonium phosphate, and yield a phosphate-free uranium concentrate. The process is covered by a preliminary German patent (DAS 1,023,748).

Ciba is out with an antileprosy drug called Ciba 1906. It's a diphenyl thiourea compound that is also an effective tuberculostat.

Copper etching solutions—the kind used in making printed circuits—can be regenerated continuously by a new method developed at Bell Telephone Laboratories (New York). It's said to eliminate equipment downtime and hazards in changing corrosive spent etchants, and to permit salvage of the etched copper. In the new process, the etching solution is composed of cupric chloride in the presence of excess chloride ion.

Cheaper crotonic acid is in the offing, thanks to a newly improved process to make the compound via oxidation of crotonaldehyde. Eastman Chemical Products, Inc., subsidiary of Eastman Kodak, did the work, expects alkyd resin makers to be attracted by the new crotonic price of 36¢/lb.



The men that make the most of them . . .

Test your Polyol I.Q.

1. What new Polyol takes the place of castor oil, providing greater stability and safety for hydraulic fluids?

* * * *

2. What Polyols, because of their unique selective solubility for aromatics, are used in processing large tonnages of benzene, toluene, p-xylene?

* * * *

3. What Polyols used as plasticizers, lubricants, solvents, are available in 12 molecular weights from 200 to 20,000 ranging from viscous liquids through waxy and hard, tough solids?

* * * *

4. What liquid Polyol has ease of addition, high boiling point—approximately 300°C., and is

Know your Polyols

(TIME ALLOWED: 2 MINUTES)

How well do you know your Polyols? Here are clues to the identity of a few of the hundreds of Polyols that Dow makes. Some of them are common as can be, some not so common, others you may not have heard of. How many can you name?

A score of 4 out of 8 gives you a passing mark, 5 out of 8 puts you in the top half of the class, 6 out of 8 makes you a real promising Polyoler, 7 out of 8 you're a genius second-class, and 8 out of 8 makes you a Professor of Polyolotry (entitles you to a free, illuminated certificate, testifying to your Polyol prowess). Ready . . . go!

used extensively in alkyd resin manufacture?

* * * *

5. What Polyol is used in making hand soaps for removal of

ink and other types of stains?

* * * *

6. What Polyol that is manufactured entirely by synthetic process is widely used in flavors, cosmetics and pharmaceuticals?

* * * *

7. What versatile Polyol — a surfactant, intermediate, plasticizer, urethane cross-linking agent — owes its exceptional usefulness to its eight OH groups?

* * * *

8. What new Polyols, based on glycerine with propylene oxide as a building block, are being manufactured to meet the urethane industry's requirements for starting materials of exacting quality?

We hope this quiz whets your appetite to know more about Polyols. Many booklets, brochures, technical papers and bulletins, including Dow's new folder, "World's Widest Line Of Polyols", are available free from your nearest Dow sales office. Meanwhile, remember that it pays to get your Polyols from "the men that make the most of them". You have a broader range to choose from . . . can get all your Polyols in one place. And, even if you need only one, you benefit from the total range of experience that has made a whole wide spectrum of Polyols possible. Write to THE DOW CHEMICAL COMPANY, Midland, Michigan, Department GD-948A.

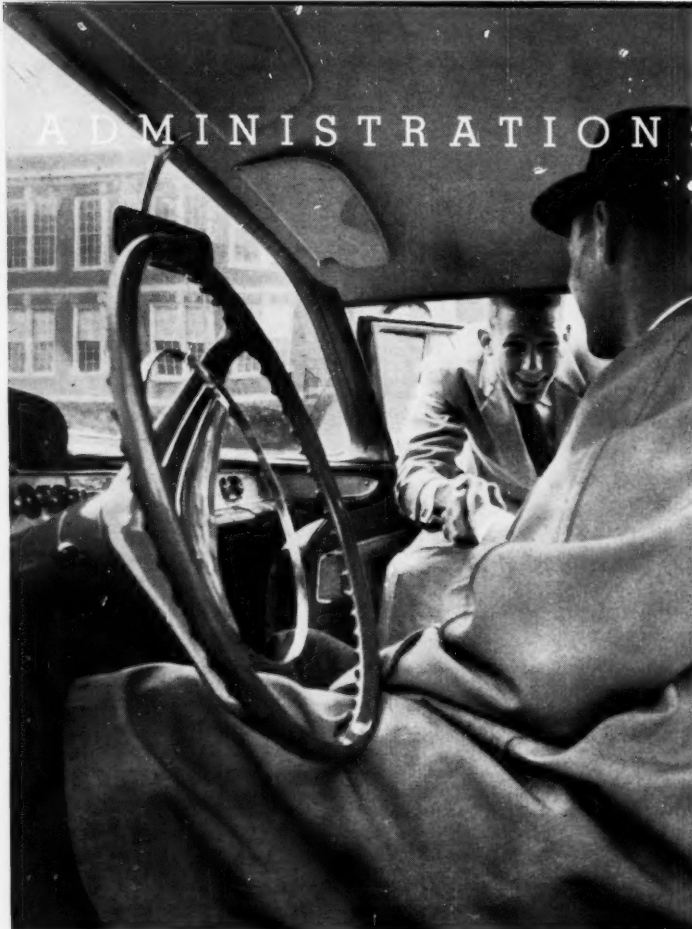
*TRADEMARK OF THE DOW CHEMICAL COMPANY

ANSWERS:

1) Polypropylene glycol, 2) Udex* brand diethylene glycol, Udex brand dipropylene glycol, 3) Polyethylene glycols, 4) Glycerine, 5) Tripropylene glycol, 6) Propylene glycol USP, 7) Hyprose SP 80, 8) Polyglycol P2000 (resin grade), Polyglycol 11 series (resin grade).

YOU CAN DEPEND ON





Don D. Hallcross, the Burns salesman, met me at school. I found him very friendly and capable.

To call on Baker, we looked up part Li sales, and made an appointment.



At Baker, Mr. Meier, in purchasing, said to talk to other groups about Li sales.



Student Works Tells Story of

Marking Chemical Progress Week, a dozen or so high school students across the nation are this week getting their first close look at the way the chemical industry works. Like 16-year-old Eddie Williamson (see pictures), they are seeing first-hand the down-to-earth process of selling and buying chemical products. One opportunity arises from the efforts of American Potash & Chemical Corp.'s heavy and industrial chemicals sales departments, which arranged to have a number of its salesmen take students with them on a typical sales day.

In planning its fifth annual observance of CPW—sponsored by Manufacturing Chemists' Assn.—AP&CC surveyed a number of previous observance programs, figured that not enough had been done to acquaint technically oriented high school students with the bread-and-butter commercial aspects of the industry. Result: students in Atlanta, Columbus,

Chemical Progress Week 1958

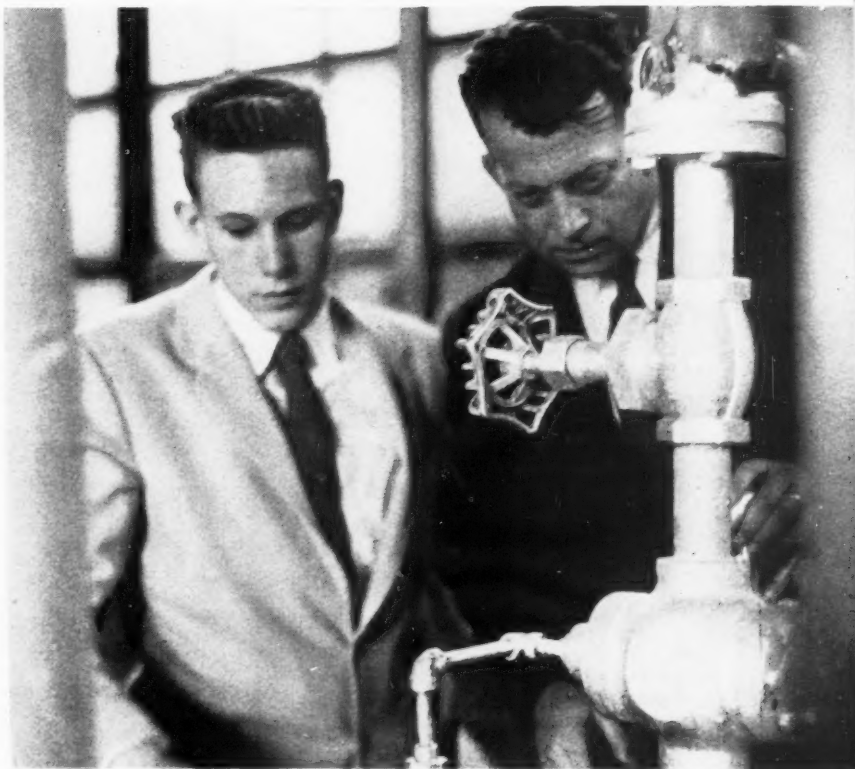
with Salesman, Progress Week

Chicago, Shreveport and New York are accompanying AP&CC salesmen on their calls to such customers as J. T. Baker Chemical Co. (pictured on these pages), Reaction Motors, Chas. Pfizer & Co., Federal Glass Co. and Smith Agricultural Chemicals Co.

Typical Day: Eddie Williamson, a junior at Bogota, N.J., high school, is typical of many of the participating students. Eddie lives in Maywood, N.J., wants to study chemistry or chemical engineering. A good student, with wide interests, Eddie hopes for an appointment to Annapolis or to go to University of North Carolina.

For his trip, Eddie met AP&CC's Trona district sales manager, Don Shallcross. First, they stopped at the New York sales office long enough to meet other people in the organization* and to prepare for a sales call on J.

*Other people Eddie met who are pictured here: Baker's chemical buyer, R.H.M. Meier, Central Control Laboratories director G. E. Wolf, and Manufacturing Superintendent Roy Meckley.



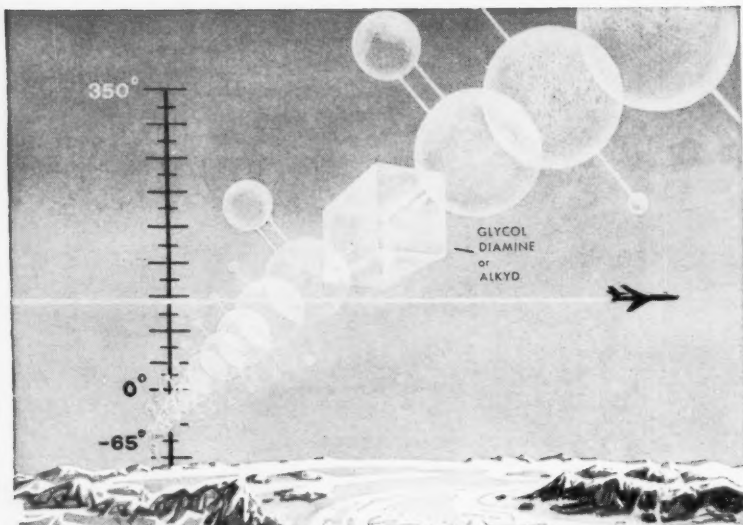
CW PHOTOS—LIONEL CRAWFORD

Mr. Meckley explained production equipment, a salesman should help customers with processing ideas.

This lab tests Li deliveries. I wish my school lab had all this.

We checked to see if a shipment of Trona's Li_2CO_3 had arrived in good order.





Harchem Sebacic Acid

... the chain that spans from cold to hot

From 65° below zero to 350° above,* modern lubricants must work under conditions where both temperatures exist in the same system. Only a sebacate makes it possible.

Plastics must meet similar problems. Mustn't crack in cold or get sticky in heat. A sebacate solves these problems, too.

Such sebacates are esters of pure sebacic acid—Harchem's 99% Sebacic Acid. And sebacates are only one of the many things that can be made with the help of Harchem Sebacic Acid. No other difunctional intermediate provides as much permanence and durability. The long straight chain of sebacic acid is present in synthetic lubricants, nylon fibres, moulding powders, polyurethanes, polyesters, alkyds and a large family of plasticizers for vinyls, synthetic rubbers, acrylics and a host of other plastics. In each, Harchem Sebacic Acid is the basis of improved performance that pays big dividends in competitive markets.

The Harchem Laboratories will help with your developments if you wish. Developments which will, we're sure, bring better products to your customers; better profits to you.

Samples of Harchem 99% Sebacic Acid and product information on request. Write Dept. H-56.00. *Fahrenheit



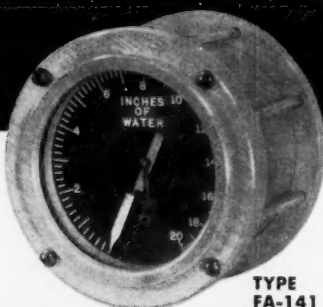
HARCHEM DIVISION

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FA-141

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ADMINISTRATION

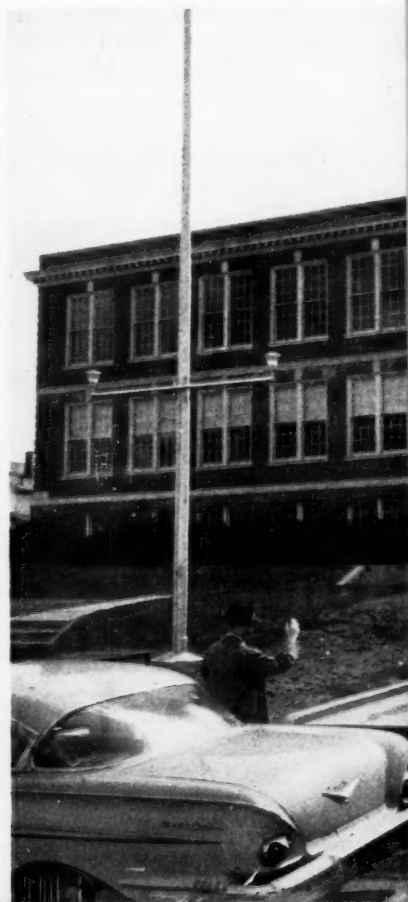


At the office we dictated a report on the call.

T. Baker at Phillipsburg, N.J., where Don wanted to clear up some questions on Baker's specifications for lithium carbonate.

At Baker's plant, they visited the chemical buyer, checked on an incoming shipment of carbonate, then went to the control labs, where Baker keeps close check on all chemicals received.

We all, back to school, I won't take these chemicals in our

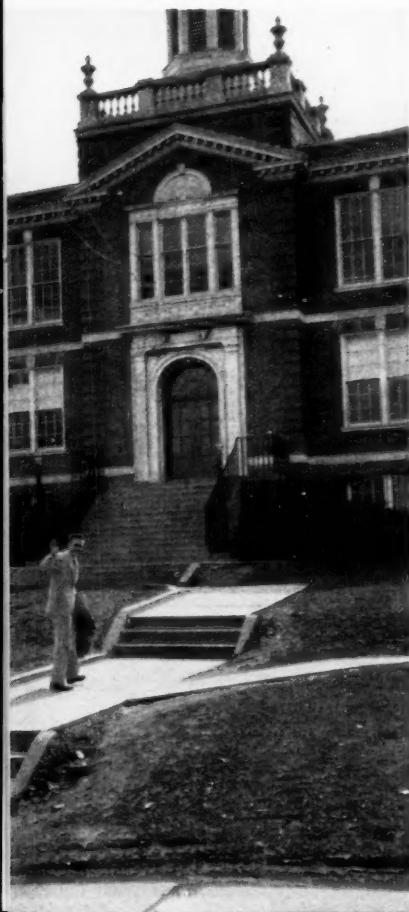




Don said TWX is for fast orders to the plants.

Back at AP&CC's office, Don and Eddie turned in their call report, checked Teletype directions to the Trona plant and relaxed awhile to discuss the day's events. Eddie's reaction to it all: "I used to think salesmen were bell-pushing peddlers, but now I can see you sure have to know a lot to sell chemicals. You can make a whole career of it."

Chem lab for granted anymore, that's for sure!



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fine chemical
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Your Koppers Coal Chemicals specialist will be glad to give you full information on the following grades of niacin available from Koppers:

Feed-Grade Niacin: Available in 50% or 80% grades, Koppers Feed-Grade Niacin is formulated from the U.S.P. niacin for uniformly high quality and consistency.

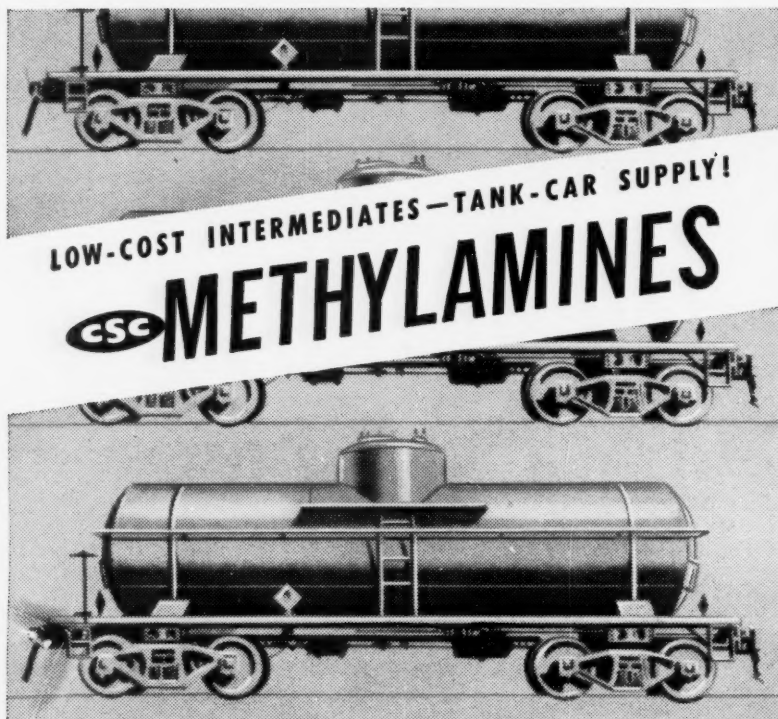
U. S. P. Niacin: A uniformly white, finely divided pure product for use in the enrichment of baked goods, cereals and other grain products, pharmaceuticals, and various medicinals.

Choose the dependable, quality source for your niacin requirements. Call your Koppers Coal Chemicals specialist, or write:

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Pittsburgh 19, Pa.



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MONOMETHYLAMINE CH_3NH_2

Manufacture of amide and sulfonated amide-type detergents and surfactants. Synthesis of caffeine, aminophylline and desoxyephedrine. Manufacture of photographic chemicals, the explosive tetryl, amide-type plasticizers, ion-exchange resins, corrosion inhibitors and paint removers.

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Raw material in manufacture of thiram sulfide-type vulcanization accelerators and of dimethyldithiocarbamic acids salts used as fungicides. Neutralizing and solubilizing agent in preparation of concentrated solutions of 2, 4-D salts. Manufacture of anti-malarials.

TRIMETHYLAMINE $(\text{CH}_3)_3\text{N}$

Preparation of long-chain quaternary ammonium compounds used as softeners, lubricants and waterproofing agents for textiles. Used with benzoyl peroxide to "set" methacrylate resins. Synthesis of cationic surface-active agents.

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Butyl Lactate Butyl Stearate
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ADMINISTRATION

DDT Decision Due

This week, a U.S. district court judge in Brooklyn, N.Y., is making ready a decision that will set the pattern for future U.S. government pest control spray programs (CW, Feb. 8, p. 96).

Federal Judge Walter Bruchhausen will soon rule on the case of 14 Long Island, N.Y., residents—led by noted naturalist Robert Cushman Murphy—seeking a permanent injunction to restrain the government from spraying Nassau and Suffolk counties with DDT from airplanes. The plaintiffs charge that a DDT spraying last spring was injurious to their health and property and to wildlife. They contend that the government exceeded its authority in ordering the spraying, and that the program was not successful. If the injunction is granted, the precedent will establish a legal roadblock against similar future programs.

The suit grew out of a gypsy moth spraying program under which 3 million lbs. of DDT were sprayed over parts of New York, New Jersey and Pennsylvania. Specific defendants are U.S. Secy. of Agriculture Ezra Benson; Lloyd Butler, area supervisor of the Plant and Pest Control Division, USDA; and Daniel Carey, commissioner of agriculture and markets for New York state.

KEY CHANGES

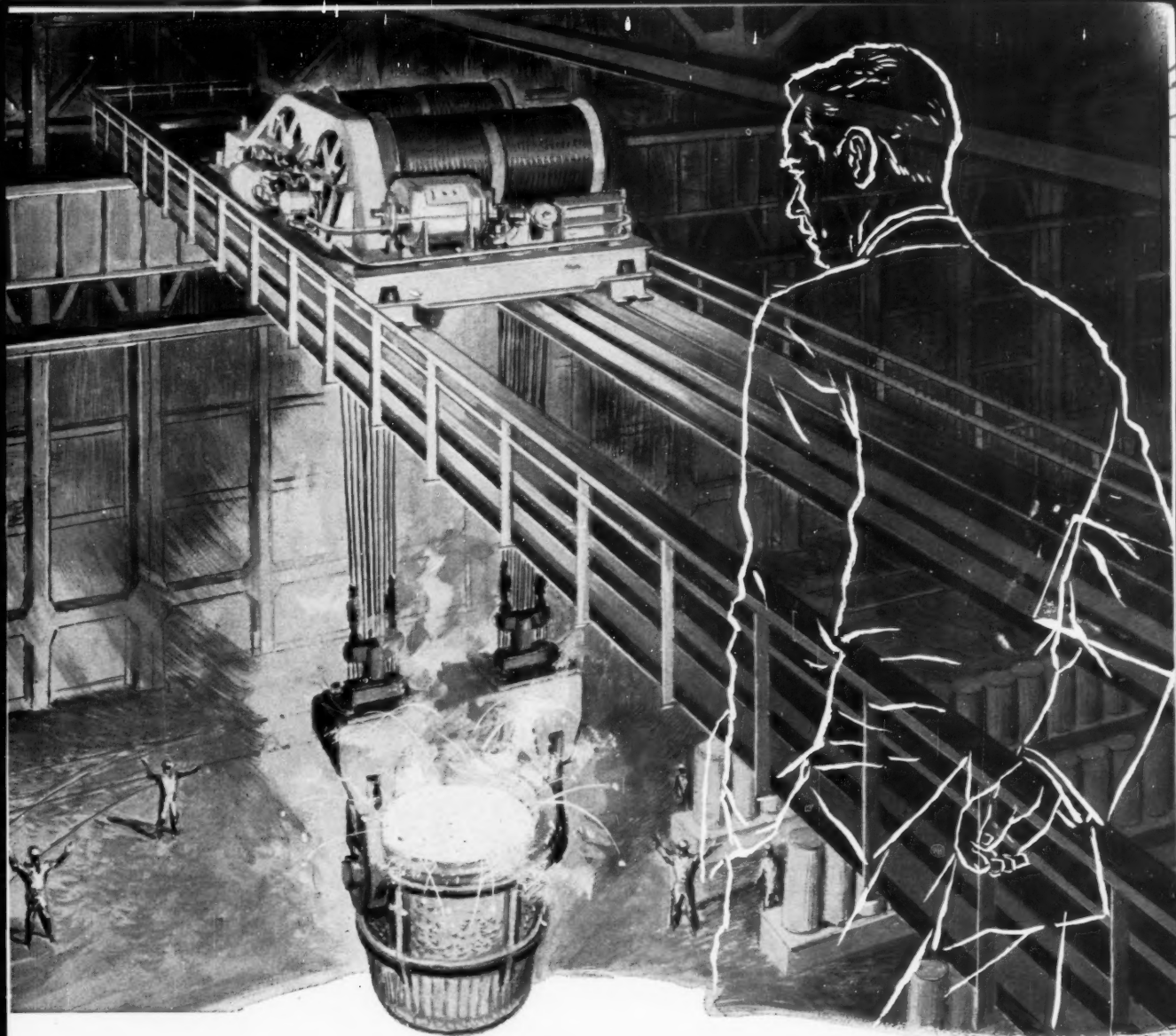
Jervis J. Babb and Vernon Taylor, Jr., to directors, International Minerals & Chemical Corp. (Chicago).

Jack H. Dollinger, to vice-president—general manager and director, Ferro Chemical Corp. (Bedford, O.).

James M. Gavin, to vice-president and director, Arthur D. Little (Cambridge, Mass.).

Harry E. Gude, to vice-president for manufacturing, Aluminum Division, Olin Mathieson Chemical Corp.

Raymond R. Hull, to vice-president; **David L. Rawls**, to vice-president in charge of sales; and **Thomas J. Skeuse**, to vice-president of operations; all of Dixon Chemical & Research, Inc., and Dixon Chemical Industries. Also, **Hull**, to general manager, I. P. Thomas Division, Dixon Chemical Industries.



HOW THE SILICONES MAN HELPED...

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THREE HUNDRED tons of molten steel handled like a cup of tea. That's power with something to spare. But increases in production, the demand to do more work with small, compact equipment keeps electric motor design engineers on their toes.

The Elliott Company of Jeannette, Pa. is one of the leading suppliers of electric motors for steel mill applications. Recently, Elliott engineers wanted to increase overload capacity, life span, and resistance to corrosive atmospheres. They decided to use Class H insulation, and asked the Silicones Man to supply the necessary silicones. The result? A complete line of Class H mill motors with an expected life ten

times that of present types! It's just one more example of how the specialized knowledge of the Silicones Man has helped solve an "impossible" problem.

Find out the latest information on silicones for Class H insulation or any of the other silicone products that solve problems of heat, cold, strength, corrosion. Call your Silicones Man, or address Dept. DC-106, Silicones Division, Union Carbide Corporation, 30 East 42nd Street, New York 17, N.Y. (In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Toronto 7, Ontario.)

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SILICONES



Finishes take a beating, too . . . when children are around. But junior's art-work wipes off clean, when the finish is skillfully formulated with the right vehicle and TITANOX* titanium dioxide white pigments.

TITANOX-RA, TITANOX-RA-50 and TITANOX-RA-NC are first choice for finishes. Here's why: they'll help you maintain the color, gloss, opacity and durability the finish must have for indoors or outdoors. And with all this, TITANOX pigments are outstanding in their working properties—adaptable to any type of mixing and grinding program. In fact, TITANOX pigments are the No. 1 choice not only for industrial product finishes, but for paper, plastics, rubber, ink, leather and ceramics as well. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities.

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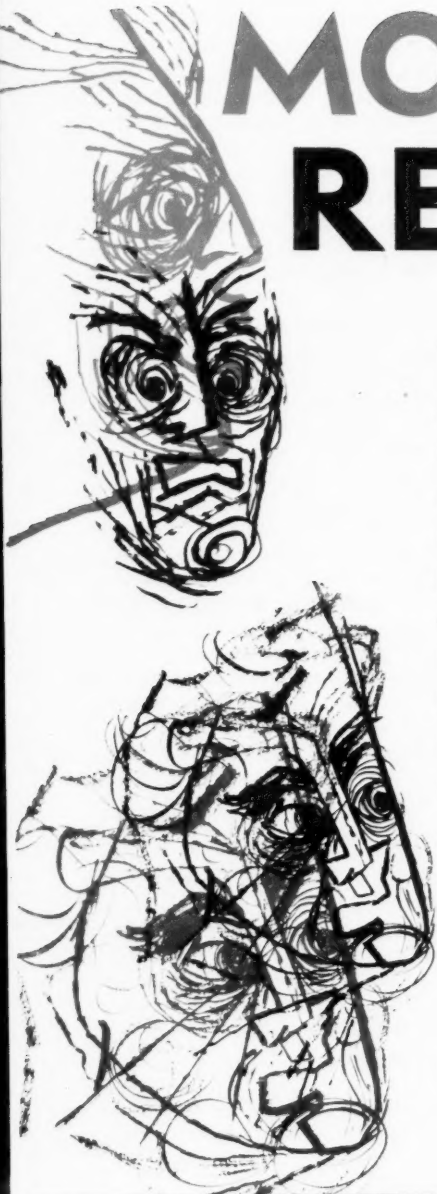


TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

*TITANOX is a registered trademark for the full line of titanium pigments offered by Titanium Pigment Corporation.

MOTIVATION RESEARCH



Vitally affecting the outcome of every selling effort—or, for that matter, every attempt to increase employee productivity or management effectiveness—are a variety of influential forces at work within people. Some of these forces, such as those symbolized on this page, are emotional—others are harder to classify. Discovering these hidden influences is the object of motivation research. Properly used, it can give you clues to more effective selling, product development, personnel management.



(Turn page for start of text.)





MOTIVATION RESEARCH

Dow Chemical is now distributing the results of a recent motivation research study on automobile service station operators. Aim: to boost private-label antifreeze sales. Dow reasons that its motivation insights will help private-label packers do a more effective sales job on this group—the principal retail antifreeze outlet.

Dow's case is a timely example of the growing acceptance and use of MR by chemical process companies. Some are applying it to marketing, others to product development, and still others to problems involving morale and efficiency of personnel. In all three areas, the MR approach is basically the same—depth interviewing to determine why people behave as they do.

Thus far, motivation research has been used mainly to determine why groups of people buy soaps, toothpastes, autos, etc. But MR's usefulness isn't limited to the consumer field, or even to marketing. Buyers of chemicals and equipment, as well as industrial personnel of all kinds, are potentially rewarding subjects of MR.

At first glance, it may be difficult to see how subsurface motivations can influence industrial chemical sales, new product development, product improvement or employee productivity, for instance. Consider these cases:

- Corn Products Refining Co. recently used motivation research (plus more usual marketing research methods) to learn more about prevailing attitudes in customer companies; how these attitudes influence the purchasing of industrial starch products. The company found that the purchasing, production and research departments each had their own special reasons—call them motivations—for responding to Corn Products' (or competitors') sales efforts.

Once it knew the factors involved, Corn Products re-evaluated its marketing approach, geared it more closely to purchaser expectations.

- General Electric Co. used motivation research to discover why direct-current motors were rejected by engineers for jobs that logically called for such motors. The company found that many otherwise-astute engineers regarded direct-current motors as "old fashioned." GE profited from its MR study, began an institutional advertising campaign (see p. 89) aimed at correcting this mistaken image. Result: increased sales of dc motors.

- Rensis Likert and Donald Pelz, two well-known social researchers at the University of Michigan Institute for Social Research, used MR on 300 scientists at the National Institutes of Health. They found that companies would do well to form research teams with varied scientific backgrounds and varied work experiences. Conclusion: applied researchers and basic researchers should mix with one another, exchange ideas and points of view. The study indicates that researchers work best in a well-balanced team—a finding that challenges the picture of the lonely, but happy, scientist.

Motivation research applied to marketing is an extension of market research, which seeks to discover: (1) who buys, (2) what they buy, (3) when they buy, (4) where they buy, (5) how they buy. Motivation researchers seek the answer to another question—why do customers buy?

Why customers say they buy may be poles apart from why they really buy. Knowing the real reasons can help management plan its sales strategy more effectively—it can provide clues to developing and marketing products that meet customer needs more precisely. Similarly, knowledge of what triggers executive or employee group actions can help management boost individual and group performance.

Discussing Dow's recent motivation survey, Director Percy Black of Social Attitude Survey, Inc. (New York, the company that conducted the study), says, "A motivation study is a depth interview, which attempts to

go beyond the usual, and perhaps prejudiced, answers that often appear in ordinary surveys."

Parker Frisselle, Dow's market research manager, adds, "In essence, all market research serves one purpose—the substitution of information for conjecture, market intelligence for hunches. This acquisition of information can reveal new areas of market effort, stimulate new ideas. Research of this nature provides an indispensable service to the marketer."

Most consumer motivation studies undertaken by advertising agencies or MR consultants aim at improving the client's advertising or market effectiveness. To a lesser extent, but with effective results, consumer product development managers have applied MR in their work. Many chemical specialty products (shampoos, detergents, dentifrices, insecticides, soaps and proprietary drugs, for example), now on the market, were shaped to some extent by MR studies. MR has also influenced design of such diverse products as automobiles, cake mixes and fountain pens.

Because motivation research serves as a link between customers (at any level) and the manufacturer, it can be useful for keeping the laboratory product-development team in touch with the needs and attitudes of many different customer groups. Today, this function of MR could be particularly important to chemical process management.

These days, more than ever, the high risks involved in developing and introducing new products heightens management's need for a measure of customer acceptance of proposed or revised products prior to marketing, even prior to development. Motivation studies can provide this measure.

Here's a case in point. MR told Foster D. Snell, New York consultant firm, that it was not advisable for one of its clients to develop and market men's plastic overshoes. Depth interviewing of men revealed that plastic overshoes wouldn't sell, because they would be regarded by men as "too effeminate."

MR Works in Consumer Field

MR takes on further significance for chemical marketers, because of its ability to provide useful marketing ideas in situations involving many similar competing products—e.g., soaps, cigarettes, dentifrices, automobiles, etc. The greater the similarity between products, motivation research has shown, the less important is reason in making a selection.

This, of course, applies to competing chemical products that have the same chemical analysis, the same physical properties and, often, the same price. Depth interviewing can reveal the reasons for customers' product selections—their opinions of different companies and their products vs. competitors' products and companies.

Motivation research probes for useful ideas rather than statistical data. As a result, its findings are likely to lead to fresh marketing approaches, or to development of new products. By the same token, it can point to fresh approaches in understanding and handling employees.

In today's rough and competitive economy, the "me too" approach to problems in any of these areas is wisely avoided.

FOUR FUNDAMENTALS

In the growing stacks of MR case histories and findings, four basic concepts keep recurring. Management men who have already tangled with MR will recognize them. Those who are thinking of utilizing motivation research would do well to remember them:

- 1) Human behavior isn't always rational.
- 2) Products, like people, have individual personalities.
- 3) Companies, like families, have their own personalities.
- 4) To sell, a product must fill or stimulate some psychological or sociological need.

Consider each of these basic points in more detail.

Irrational behavior: They may like to think so, but industrial customers



Before MR

Dow touted Saran-Wrap's uniqueness. Motivation research showed, however, that women's enthusiasm was dampened by difficulties in using it.



After MR

The advertising message was changed to resolve the user's frustrations by showing, step-by-step, the right way to use Saran-Wrap.



MOTIVATION RESEARCH

don't invariably pursue logical economic or psychological goals. People are people, whether they are selecting a new automobile or functioning as purchasing agents of large corporations. They have different and often conflicting goals for each of their roles: consumers, workers, customers, executives, voters, parents. To reach each goal, they follow a rationale determined by the dynamic balance of many economic, social and psychological pressures.

Dow was seeking to pinpoint these factors in its motivation study of service station dealers. The findings revealed that dealers hoped to be regarded as a combination of small businessman, mechanic, and "good Joe." Fear of failure hampers the average dealer's relationships with his customers, dilutes his feelings of loyalty to the company whose product he vends, limits his initiative as a businessman.

These are the pressures that keep him from pushing his company's brand of petroleum products, tires, batteries and accessories. To increase the dealer's loyalty to his company and its products, Dow recommends that its customers take a new approach to the service station dealer—one that will convince him that he's a respected, independent businessman who will receive the fullest cooperation and understanding from his petroleum company (which sells anti-freeze to him).

Similar needs for acceptance and approval by people in the same occupational groups have led farmers to try new agricultural chemicals and physicians to prescribe new drugs.

Product personalities: Products, like people, have individual personalities. A product develops its personality from its physical characteristics, its price, the way it's advertised, where it's sold, the personality of the producing company and the product's

performance in actual use. In addition, part of its personality results from the history of the product's competition and the competition's standing with the customer.

Successful brands usually have well-integrated personalities. The product's physical characteristics seem to customers to be in harmony with the product's performance, as well as with its advertising, its distribution and its packaging.

Company personalities: MR studies show that companies, like families, have personality patterns. Even the "objective" engineer's buying choices are influenced by images of companies' personalities. G. M. Basford, New York advertising and public relations agency, used MR to learn the factors influencing the selection of an engineering firm to build a plant.

Basford's discovery: chemical engineers limit their choices to engineering companies that seem "progressive," hence inspire confidence. Impressions of company personalities are carried over from engineers' college days—e.g., from classroom aids supplied by the engineering firm. Early impressions of a company were reinforced by its advertising, reputation with other engineers, and the types of projects it handles.

Filling customer needs: Du Pont's Petroleum Chemicals Division found through MR that customers buy automobile polish to avoid appearing inferior in the eyes of others. That GE study on electric motor purchases revealed that engineers felt more "modern" when they were specifying alternating-current motors.

These two cases emphasize that a product must fill (or stimulate) a need, must perform its function satisfactorily in terms of the customer's evaluation of performance. Because customers judge performance in their own terms, not necessarily the manufacturer's terms, some marketers and product development men make the mistake of regarding customers as being incapable of distinguishing quality. It all comes down to this:

products are subject to many standards of evaluation.

As these examples suggest, customers expect products to fill more than their nominal functions. Industrial and consumer products are also purchased as extensions of the user's personality, even as symbols of position.

Suppliers of industrial chemicals can learn through motivation studies to see their own products and company as customers see them—Corn Products Refining did this (see p. 91).

Little has been done with motivation research to fully develop these four basic concepts as they apply to chemical marketing.

Chemical process management can learn more about why industrial customers buy, what the hidden factors are that make them choose between comparable products selling for the same price. Chemicals producers and marketers who know more about these subsurface factors will be able to sell that much more effectively.

PROGRESS OR POISON?

Depth interviewing is still as hot an issue among marketing experts as it was when it first gained prominence in advertising and marketing circles about 10 years ago. The controversy is still pitched around techniques and benefits. Some marketing experts hail the depth interview as a key to economic progress. Others condemn it as a weapon to rob consumers of their political and social freedoms, as well as their hard-earned dollars. Arguments have fanned from New York luncheon tables to corporation conference rooms in San Francisco. And more than one best-seller has been distilled from the controversy.

The label "motivation research" arouses controversy partly because of sweeping claims made for it by a few leading practitioners and partly because of the sweeping power attributed to it by critics. Thus Corn Products' Director of Commercial Research Larry Gibson objects to use of the term in reference to his company's

MR Works in Industrial Field

pioneering efforts in studying chemical sales. And, like Gibson, many informed process industry men prefer to use labels without derogatory connotations—"exploratory research," "attitude studies," or "surveys of customer needs."

Since motivation studies do not produce quantitative data, but rather direction and insight, they are useful in guiding the creative aspects of product development and marketing. Such qualitative research can never replace sound market analysis, of course. Process company executives must still have access to facts and figures obtained from market research.

Depth studies have one of the limitations of market research—they cannot predict absolutely the success of a new product. New motivations may evolve rapidly with changing economic conditions, public moods or ideas. Such new motivations may evolve during the brief period between the study and the marketing of a product. Technological, advertising and styling changes and other such factors may increase or decrease acceptance of a new or improved product. Especially where chemical specialties are concerned, customers have learned they can expect technological change; yearly improvements are almost demanded of the manufacturer.

Motivation research is out of the question for companies that are dominated by management's preferences rather than customers' or employees' opinions and needs. It can contribute little to a company that considers its customers too uninformed to be knowledgeable. And it can contribute almost nothing to a company that prefers the doubtful security of following the lead rather than taking it.

THE MEN BEHIND MR

In any research effort, success is usually proportional to the researcher's skill. The same holds true for MR. The best motivation researchers have solid backgrounds in the social sciences—psychology, sociology,



When motivation research showed General Electric that some engineers regarded direct-current motors as "old-fashioned," the company campaigned to change this image. Above, ad stresses dc. as answer to up-to-the-minute automatic installations. Below, ease of conversion to dc. is played up.





MOTIVATION RESEARCH

anthropology—plus practical experience with survey techniques. Previous experience in the product or subject area under study is an asset. So is previous experience in industry.

Motivation interviewers are careful to appear neutral, interested, receptive and passive in the depth interview, but remain alert to many cues. Group interviewers, on the other hand, usually try to appear energetic and extroverted. Opinion leaders (top executives, physicians, government officials, association officers) give the best response to an apparent equal in professional status—the MR study director, for example.

No interview is ever conducted by a person the interviewee knows personally, or by someone with a vested interest in the outcome of the study that is being undertaken.

In conducting studies related to chemical product development or marketing, the motivation analyst doesn't need extensive knowledge of chemistry or engineering. His function is to interpret people's reactions in a form that management can use. Often the motivation analyst has the problem of winning management's confidence on the validity of the findings because MR results de-emphasize quantitative data.

Most good analysts steer clear of their own technical jargon in interpreting findings to management. Instead of relying on psychological or sociological terms, they prefer to explain their results in everyday language. Extreme psychoanalytical interpretations (e.g., to a woman, baking a cake is like giving birth to a baby) are avoided.

Motivation researchers are usually retained by process industry firms for a specific project. There's a long list of MR consulting firms, private consultants, or advertising agencies that have MR experts on their staffs.

SETTING THE TARGET

In setting up a motivation study, the researcher's first job is to define whose motivations are to be probed and for what purpose. Compared to market research studies, there are few rules for designing MR studies. Approaches are determined more by the subject matter covered and anticipated difficulties in bringing motivations to light. Questions posed by company administrators (in personnel, product development or marketing, depending on the area being studied) often help the motivation researcher to pinpoint his study.

Besides talking with executives, analysts like to confer with as many people who are concerned with the study area as possible; they're anxious to hear everyone's hunches and impressions about the possible motivations involved in the problem. In addition, where product development or marketing problems are the issue, motivation analysts review available market data and product sales reports to orient themselves to the problem.

Design of the MR study helps determine its size. Studies vary in size from 25 intensive personal interviews to 500 interviews with people in groups. The average is 100 personal interviews—and there's a trend in favor of large survey groups that are statistically controlled.

FEELINGS, NOT FACTS

The depth interview, in which people are encouraged to speak freely, sets MR apart from market surveys in which the researcher strives for consistency of data and accuracy of detail.

Most MR studies use the survey method, gathering personal interviews from representative people; some studies use group interviews of three or more people. These group interviews occasionally turn up social influences, prejudices and fears which are not apparent in sessions with individuals. Observing customers' be-

havior is another technique that is particularly useful for appraising a product's ease of handling.

Probing people's thoughts and feelings is a difficult process at best, since most adults have spent a lifetime suppressing numerous emotions. Even in speaking to an anonymous and sympathetic stranger such as the interviewer, people tend to give stereotyped reasons for their behavior. Motivation researchers try to penetrate such stereotypes to find out what they really mean to each individual.

To get people to talk even more honestly than they often talk to themselves, researchers use a combination of these techniques:

Technique 1: The interviewer starts with factual questions that are easy to answer, so as to establish a sense of mutual confidence. As the interview progresses, the questions veer away from facts and concentrate more on the person's feelings.

Showing the interviewee new products, new advertising, samples of competitive products, and requesting he demonstrate how a product is used are normal parts of the interview. Questions about age, education, occupation and other personal data are asked at the end of the interview.

Many interviewers note everything that happens during the session, even if the occurrences seem unrelated to the study. Unrelated items, on closer analysis, often hold important clues to motivations.

Technique 2: Instead of asking a person how he himself feels about something, he is asked to tell how other people feel. People are prone to attribute to others the feeling they are, for various reasons, unwilling to admit to themselves.

Technique 3: Instead of asking questions, the interviewer requests the person to tell a story about a photograph or sketch. Occasionally he asks him to fill in the missing lines of a cartoon. For concepts that are tough to express, the subject is asked to match pictures, associate words, or

complete sentences. These are all ways of gaining insight into a person's motivations.

Technique 4: Interviewing procedure varies slightly where product tests and demonstrations are involved. The interviewer asks questions of the subject before he's exposed to the product, and then again after he uses it. During the actual use test, the interviewer remains in the background, observing reactions. Often, several observations of each individual are needed in order to obtain a "normal" picture. Intensive questions (Why did you do this? How do you feel about that?) come after the use test, or even at the end of a series of such tests.

FINDING THE PAYOFF

MR studies also differ from market studies in the handling and interpretation of gathered data. In MR, researchers generally try to preserve the color of the interviews, use quotations and incidents to illustrate the conclusions. Wherever possible, the language and terminology used by those interviewed is carried into the report, along with some expression of the results in more familiar industry terms.

Opening "factual" questions are seldom taken into account in analyzing MR results, since their function is merely to set the stage rather than to establish motivations. Considerable attention is usually given to the reaction of "extremist" groups, like heavy users, in contrast to nonusers. Their opinions usually offer excellent clues to a product's appeal.

Statistical tables and charts are rare in motivation reports. A thorough study often has at least one major finding that "everybody knew all along" but "had forgotten in the course of doing business." In fact, some MR studies serve only to confirm an idea that management has felt was true all along, but couldn't quite prove. A good study challenges orthodox thinking in a company, sometimes in an industry.

MR can tell you what factors influence the management groups that buy chemicals

Corn Products Refining Co. learned:

In two-thirds of the cases studied, purchasing and administrative executives had the most say in the buying decision, were influenced by (in order of importance):

- 1. Price**
- 2. Service (quick delivery, product availability)**
- 3. Product specifications**
- 4. Technical assistance available to their firm**
- 5. Interest shown by supplier in purchaser's company**
- 6. Reciprocity**

In one-third of the cases studied, production executives and technologists had the most say in the buying decision, were influenced by:

- 1. Technical assistance available to their firm**
- 2. Product specifications**
- 3. R&D reputation of the supplier as it related to purchaser's industry**
- 4. Price**
- 5. Service**

CW Report

COUNTING THE COST

To a company with a strong market research program, the yearly dollar outlay for a thorough motivation research program will probably seem small. On the other hand, the cost per interview may seem high. A typical MR survey of 100 interviews compares in cost with a mail survey of 2,500 completed cases, or a door-to-door survey of 500 interviews. By studying each case in depth, however, motivation researchers are able to make valid observations using a smaller number of interviews.

Motivation techniques offer time savings that are important to cost-conscious CPI management men. MR can turn up ideas in a relatively short time, often half that required for market surveys. A large MR study covering an entire product line of one company took about three months to complete. A small study that focuses on a specific product could probably be completed in less than a month.

Though quick results are possible with MR, the researcher must take up the valuable time of administrators. Few companies have MR men on their R&D or marketing staffs. The study director, whether a consultant or a regular employee, should report to the administrator who has final say-so in making decisions in the area of the study. This might be the head of R&D, technical service, marketing, market research, advertising, production or personnel.

After findings have been reported, it takes more time for management to take action on them. MR ideas are turned into prototype products, marketing campaigns, or changes in personnel policies. When management is satisfied with the prototypes, it can go full-speed ahead in applying the MR findings on a larger scale. Many management men who question the efficacy of motivation research are usually surprised to find that, with MR working for them, they can bring the thinking and feeling of their personnel, customers and the consuming public into their laboratories, offices and conference rooms.

AN ACTUAL INTERVIEW

What does an MR interview sound like? Here's a brief excerpt from an actual session with a development engineer in a firm that uses pigments in making rubber and plastic products for the building industry. The interviewer represents a pigment firm.

Interviewer: "Then you're very interested in setting up an automatic handling system. Will you tell me more about the problems you've run into in your work?"

Engineer: "Well, I've been having trouble developing automatic handling of pigments. I'd like to be able to control the amounts of pigment used per batch. For one thing, this would cut down on the amount of spoilage of finished materials."

Interviewer: "That sounds quite worthwhile. What seems to be the trouble?"

Engineer: "Dusting is a big problem. So far as I know, there's no machine available today that can handle finely powdered materials, like pigments. Somebody should make pigments in pellet form instead of powdered. That would be a great idea."

Interviewer: "If some company developed a line of pigments in pellet form, would you recommend buying them?"

Engineer: "I sure would. Any vendor who solves customer problems should be encouraged. Unfortunately,

though, I don't handle purchasing and I never get to see salesmen. I don't even have much to say on raw material specifications."

Interviewer: "Who has the most to say about purchasing?"

Engineer: "The executive vice-president. Nobody ever comes to see me. Only one man counts, the executive vice-president. He's everybody's boss."

Interviewer: "Very interesting. What do you think of technical service programs?"

Engineer: "I don't know of any company that has one on pigments. Most companies have good chemists and engineers on their staffs, but they aren't familiar with my technical problems."

Interviewer: "Do you think technical service programs are for the benefit of the customer or the supplier?"

Engineer: "If they don't benefit the supplier, they don't last very long."

From this MR session, an interviewer would recommend, for example, that the pigment company's management consider: (1) making pigments in pellet and liquid form, (2) seeking to develop pigments that dust less, (3) more effective publicity on its technical service program, (4) a new sales approach directed to development personnel in various industries.

Reprints of this CW Report are available at \$1 each from CHEMICAL WEEK, 330 West 42nd Street, New York 36, N.Y. Bulk rates on request.

Meet the Author

Audrey Langdon, six-year specialist in motivation research, operates her own opinion research and public relations agency in New York. Miss Langdon organized and directed an MR program on consumer needs and attitudes to guide product development at Colgate-Palmolive and headed the firm's R&D public relations activities. At Kenyon & Eckhardt, she directed consumer attitude studies.

Well-known for her MR work in chemical specialties, she has designed, conducted, analyzed and made recommendations on about 100 MR studies related to product development, marketing, advertising. She is a graduate of University of Pittsburgh.



U.S.I. CHEMICAL NEWS

April 19

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A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries

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1958

ISOSEBACIC® Acid Process Covered by 8 U.S.I. Patents

Synthesis of U.S.I.'s new intermediate for the plastics industry, ISOSEBACIC acid, is detailed in a series of eight patents issued on December 17 of this past year to Dr. Charles E. Frank and other members of the company's research laboratories. Dr. Frank is discussing the material contained in these patents before the alkali metals symposium at the ACS meeting in San Francisco this month.

The new intermediate is a mixture of sebacic acid, 2-ethylsebacic acid and 2,5-diethyladipic acid—the latter two compounds being relatively unknown until the development of this synthesis. Here are the patent numbers and the subjects they cover:

USP 2,816,913—Preparation of Substituted Acids

USP 2,816,914—Dimerization Process

USP 2,816,916—Dimerization Process

USP 2,816,917—Selective Process for Dimerization of Unsaturated Hydrocarbons

USP 2,816,918—Carbonation Method

USP 2,816,919—Method of Preparing Acyclic Carboxylic Acids

USP 2,816,935—Process for the Preparation of Alkali Metal Derivatives of Conjugated Diolefins and Vinyl Aromatic Compounds

USP 2,816,936—Process for Formation of Dialkali Metal Dimers of Diolefins

A plant to produce ISOSEBACIC acid in commercial quantity is now starting up at U.S.I.'s major chemical complex in Tuscola, Illinois. Potential applications of the new intermediate include the manufacture of plasticizers, ester lubricants, alkyds, polyamides, polyurethanes, reinforced plastics and in chemical synthesis.

New Motor Pump Designed To Move Liquid Metals in Nuclear Power Reactors

A new type of pump has been developed to circulate liquid metal coolants such as sodium and sodium-potassium (NaK) at high temperature through hermetically sealed systems in nuclear power plants.

The prototype for the new pump was tested at temperatures up to 1,265°F. After 3,500 hours of operation at temperatures constantly above 1,000°F., inspection showed all parts of the pump to be in excellent condition.

Since some liquid metals are not only chemically active but also become radioactive when used as coolants in nuclear reactors, the liquid metal pump is hermetically sealed to make it leak-proof. It can be obtained in capacities ranging from 150 to 5,000 gallons per minute at operating temperatures up to 1,600°F.

The operating temperature of the new pump motor is said to be independent of the temperature of the liquid metal being circulated, permitting operation in reactor systems where temperatures are even higher than the 1,265°F used in testing.

Other equipment for handling liquid sodium is discussed in a booklet entitled "Handling Liquid Sodium" which is published by U.S.I.

Mallory-Sharon Zirconium Plant Comes Onstream at Ashtabula, O.

2,000,000 Pound-Per-Year Plant Also Produces Hafnium

The new Mallory-Sharon Metals Corporation is owned one-third each by National Distillers, P. R. Mallory and Sharon Steel. Zirconium sponge and platelets are now in production at the company's new plant in Ashtabula, Ohio.

Moffett Becomes Assistant Sales Manager for U.S.I. Polyethylene Resins

John K. Moffett, Jr. has been appointed as Assistant Manager of PETROTHENE® Polyethylene Sales at U.S.I. Mr. Moffett graduated from Yale in 1948 and has been employed since that time by U.S.I. in various capacities. He was supervisor of the company's sodium



peroxide plant, head of sodium peroxide sales, and at the time of his new appointment was in a sales development position for U.S.I. PETROTHENE polyethylene resins.

U.S.I. Building Tantalum-Columbium Pilot Plant

U.S.I. is constructing a pilot plant to produce tantalum and columbium metals in Cincinnati, Ohio, site of the U.S.I. Research Laboratories. Part of the same facilities that were employed for piloting zirconium and titanium will be used in the new pilot unit, which is expected to be onstream shortly.

Capacity of the pilot plant will be one ton of combined metals per month on a one shift per day basis, three tons per month on a round-the-clock basis. The two metals will be produced in approximately equal quantities although variations of from 10% tantalum up to 60% tantalum are possible, depending upon the ore used.

The tantalum and columbium (also called niobium) will be produced by a U.S.I.-developed sodium reduction process. A sodium reduction process is in use at the Ashtabula, Ohio zirconium plant of Mallory-Sharon Metals, which is one-third owned by U.S.I.-National Distillers. A related process will also be used in the Mallory-Sharon titanium plant now under construction at Ashtabula.

Pilot operation and initial market development programs for tantalum and columbium will be undertaken by U.S.I. independently of its association with Mallory-Sharon Metals. However, it is expected that any commercial facilities to be built after the pilot plant pro-

Half the output of the installation is committed for the next five years under contract with the Atomic Energy Commission. The balance is available to industry in both commercial and reactor grades for nuclear work as well as for structural use where high corrosion resistance is desired.

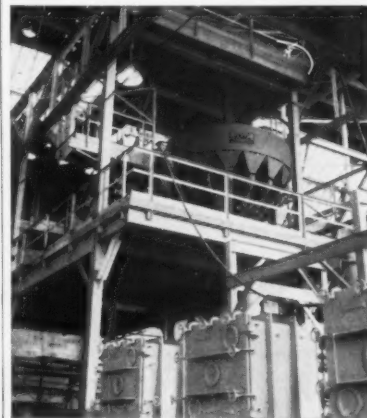
Hafnium tetrachloride, oxide, sponge and platelets are also produced as an adjunct to the zirconium operation. Hafnium, because of its ready absorption of neutrons, makes excellent control rod material in reactor cores. It is in fact used for that purpose in the Shippingport installation now delivering electricity to the commercial grid of the Duquesne Light Co.

Sodium Reduction Process Employed

The new plant is the first to make zirconium sponge and platelets employing semi-continuous production techniques developed by the U.S.I. research group. These techniques involve the use of sodium as the reducing agent for zirconium tetrachloride, and yield sponge of greater purity as a result. The method, which is also being applied to other metals such as hafnium and titanium, tantalum and columbium (niobium), has the advantage over other processes of a lower initial investment cost.

Mallory-Sharon Metals has been granted an exclusive license to use this process. The sodium for the process comes from the U.S.I. sodium operation three-quarters of a mile from the new plant.

MORE



Part of the processing equipment at the Mallory-Sharon Metals zirconium plant, now onstream at Ashtabula, Ohio.

MORE

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U.S.I. CHEMICAL NEWS

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CONTINUED

Zirconium Plant

Zirconium Platelets Non-Pyrophoric

Reactor and commercial grades of zirconium are being supplied by Mallory-Sharon Metals in the form of sponge, platelets, unalloyed zirconium and zircaloy ingots and mill products. Platelets—irregular, flake-like pieces about the size of dimes, and quarters—are non-pyrophoric and non-hygroscopic. They insure greater safety during handling and shipping. They can be compacted for melting as easily as sponge and with virtually no waste. They are of extremely high purity, being almost completely free of sodium, magnesium, chlorides, hydrogen and moisture.

Zirconium Role in Reactors

Reactor-grade zirconium is essential as structural material for atomic reactors and for cladding uranium because of its ability to let neutrons pass through, thereby permitting maximum fuel efficiency of the reactor. Zirconium also has extremely high corrosion and heat resistance, vital to atomic energy applications. Hafnium, always found associated with zirconium in the natural state, must be removed in an extra refining step in the manufacture of reactor-grade material, because of its neutron-trapping properties. Hafnium does not interfere with zirconium's corrosion resistance, however.

Zirconium Role in Chemical Industry

Commercial-grade zirconium, with 1-3% hafnium content, shows great promise for the chemical process industries. It has excellent resistance to acids, alkalis, chlorine and chlorides, corrosion and heat, combined with strength, ductility, light weight and good machining properties.

CONTINUED

Pilot Plant

gram is completed, will be owned by Mallory-Sharon Metals.

Primary market for tantalum is expected to be the chemical process industries where it has long been used because of its chemical inertness, especially to hydrochloric acid.

Columbium, or niobium as it is often called,

has been in demand as an alloying material for steel. More recent interest in this metal stems from its properties of low neutron cross-section, high-temperature strength, high melting point and the insolubility of columbium oxide in the metal at elevated temperatures. This combination of properties makes it a material with considerable promise for nuclear applications, including gas-cooled atomic reactors, as well as certain applications in supersonic aircraft and gas turbines.

Black Polyethylene Used For Ventilating Systems In Chemical Laboratories

Ventilating systems for laboratories, which will withstand corrosive fumes without deteriorating or discoloring, are now being fabricated completely of black, all-weather polyethylene. Since polyethylene compounded with black is expected to give 15 to 20 years of service, its substitution for metal should reduce maintenance and replacement problems substantially on fume hoods, exhaust stacks, fans and fittings.



Black polyethylene fume hood and stack exhaust acid vapors without deteriorating, cut replacement costs (photo courtesy American Agile).

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

For corrosion studies, two special solutions are now offered which isolate surface films from metals. An iodine-methanol solution is designed for aluminum alloys containing no copper, an iodine-methanol sulfosalicylic acid solution for aluminum-copper alloys. **No. 1340**

New 24-page booklet on titanium—includes physical and mechanical properties, metallurgy, corrosion resistance, methods of machining, forming and welding. **No. 1341**

Atomic lamps said to provide power-free, uninterrupted light for up to 10 years have been developed. They use radioactive krypton—85 gas to excite specially processed, hermetically sealed phosphor crystals. **No. 1342**

Cost of polyurethane installations foamed-in-place can be estimated with a nomograph chart now available. Thickness, area, density of stock and price per pound must be known. Chart eliminates need for calculation. **No. 1343**

Concentrated (98%) ethylene diamine can now be obtained in commercial quantities for use by manufacturers of textile finishing and polyamine resins, synthetic waxes, rubber chemicals, fungicides, pharmaceuticals. **No. 1344**

New polyethylene-to-metal adapter has been devised to connect polyethylene and metal pipes and fittings without using clamps. It consists of a threaded polyethylene gasket between metal nut and tailpiece. **No. 1345**

4,4'-Diaminostilbene is available in laboratory quantity. It is readily soluble in methanol and ethanol, sparingly soluble in carbon disulfide, benzene, hot water. Forms azo dyes, useful as organic intermediate. **No. 1346**

Ten new atomic models for constructing organic metal chelates are now on the market. They are scaled to a magnification of 1.5 X 10⁴. Four models represent the central metal atoms. Others used for rest of chelate. **No. 1347**

New silicone fluid of low viscosity has been introduced for use as a damping medium and hydraulic fluid. Is claimed to have lower viscosity-temperature coefficient and lower pour point than most methyl silicone fluids. **No. 1348**

Pyroglutamic acid (L-2-pyrrolidone-5-carboxylic acid) is now offered in pilot plant quantities. This heterocyclic amino acid has 2 reactive positions—a carboxyl and a cyclic amide group. Suggested as intermediate and for resolving racemic mixtures of amines. **No. 1349**

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Market Newsletter

CHEMICAL WEEK

April 19, 1958

Polyethylene export guesses can now be checked. Official government data—latest available is for Jan. '58—will clear up at least one puzzling aspect of most polyethylene end-use patterns—just how much flows overseas. It's the first time polyethylene has made the export data lists.

Here's the January rundown: Slightly more than 19.8 million lbs. of resin were exported. (This includes some unfinished and semifinished products, but excludes laminates and film and sheeting.) Total film and sheet shipped out amounted to 950,000 lbs.

Principal recipients include Japan, about 3 million lbs.; France, nearly 2.5 million; West Germany and Belgium, about 2 million each. United Kingdom and the Netherlands took about 1.5 million lbs. each.

It's a very unrealistic projection, of course, but if January's rate is maintained, '58 exports could add up to nearly 240 million lbs. of polyethylene—roughly one-third of U. S. production.

•
Japan may soon be scratched as a polyethylene importer, and as an outside customer for a raft of petrochemicals as well. Early next week Mitsui Petrochemical Industries Ltd. will "officially dedicate" its new \$30-million complex at Iwakuni. Polyethylene production there is already under way at a rate of 1,000 tons/month.

In addition, Sumitomo Chemical Co. Ltd. starts turning out polyethylene this month; initial output, slated at 150 tons/month, will work up to 1,000 tons (*CW*, March 29, p. 22).

The Mitsui operation, which is and will be producing a number of gas- and oil-derived chemicals including ethylene, ethylene oxide, cumene (starting up now), phenol, and dimethyl terephthalate, is unique in a couple of ways: it's the first "comprehensive" petrochemical complex in Asia; practically all the process know-how comes from U.S. firms, particularly Scientific Design Co., Inc.

•
Repercussions of the recent aluminum price cut continue to ripple through the industry. U.S. producers, forced to follow the Canadian reduction (*CW Market Newsletter*, April 5), are voluble in their denunciation of the initial action as an effective inventory whittler or sales booster. Sellers here believe aluminum hard-sell should be on the basis of the metal's advantages over other materials, rather than on price.

Another side-effect of the prime aluminum reduction: some fabricated aluminum product prices are being cut, and it's likely that "independent" fabricators may be competitively pinched by the move. Integrated producers, who also sell pig to independents, now are reportedly in a position to sell fabricated products at prices that are lower than the independents can quote.

Market Newsletter

(Continued)

Chances are the House Small Business Committee, which has occasionally eyed aluminum industry activities over the years, will explore the current situation in hearings scheduled for week after next (April 29).

•
Meanwhile, in other nonferrous metals markets, copper and zinc prices have eased again. Last month's $\frac{1}{2}$ ¢/lb. hike in U.S. custom-smelted copper was wiped out last week by a lower $23\frac{1}{2}$ ¢/lb. posting. Primary producers, however, are still standing pat with the 25¢ tag established in January.

Although the basic zinc price (10¢/lb.) didn't follow the recent lead price drop, decision by at least one seller to reduce tags on certain high grades of zinc may be an indication that the basic price is in jeopardy.

•
Toluene prices are down substantially, but the drop comes as no surprise. It has been obvious for months (*CW Market Newsletter*, Oct. 26, '57) that producers were having a tough time maintaining schedules. Reasons: slowing demand, growing stocks, competition from solvent substitutes and blended materials.

Coke-oven toluene sellers were first to succumb to the mounting pressure last week, but petroleum producers were quick to follow the down-trend. The coal-derived material is now priced at 25¢/gal., delivered east of the Rockies; previous quote was $29\frac{1}{2}$ ¢/gal. on an f.o.b. plant, freight-equalized basis.

There's no word yet on whether benzene prices will also dive, even though benzene has been buffeted by more acute market-depressing factors than has toluene. Imports of lower-cost foreign benzene are climbing again; demand, especially for some of the larger outlets, isn't too brisk. And of greater concern to marketers is the swelling U.S. petrobenzene capacity that could push potential oversupply close to 90 million gal. this year.

But there's still a powerful price prop: lower tags, insist producers, won't help business a bit—so why cut?

SELECTED PRICE CHANGES — WEEK ENDING APRIL 14, 1958

| | Change | New Price |
|--|---------|-----------|
| DOWN | | |
| Toluene, coke-oven, dlvd., E. of Rocky Mountains, gal. | \$0.045 | \$0.25 |
| Platinum metal, works, oz. | 1.00 | 68.00 |
| Tin metal (Straits) | 0.00125 | 0.925 |

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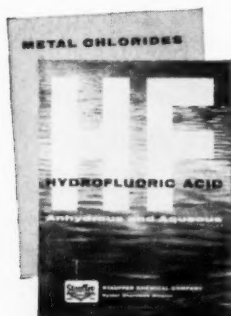
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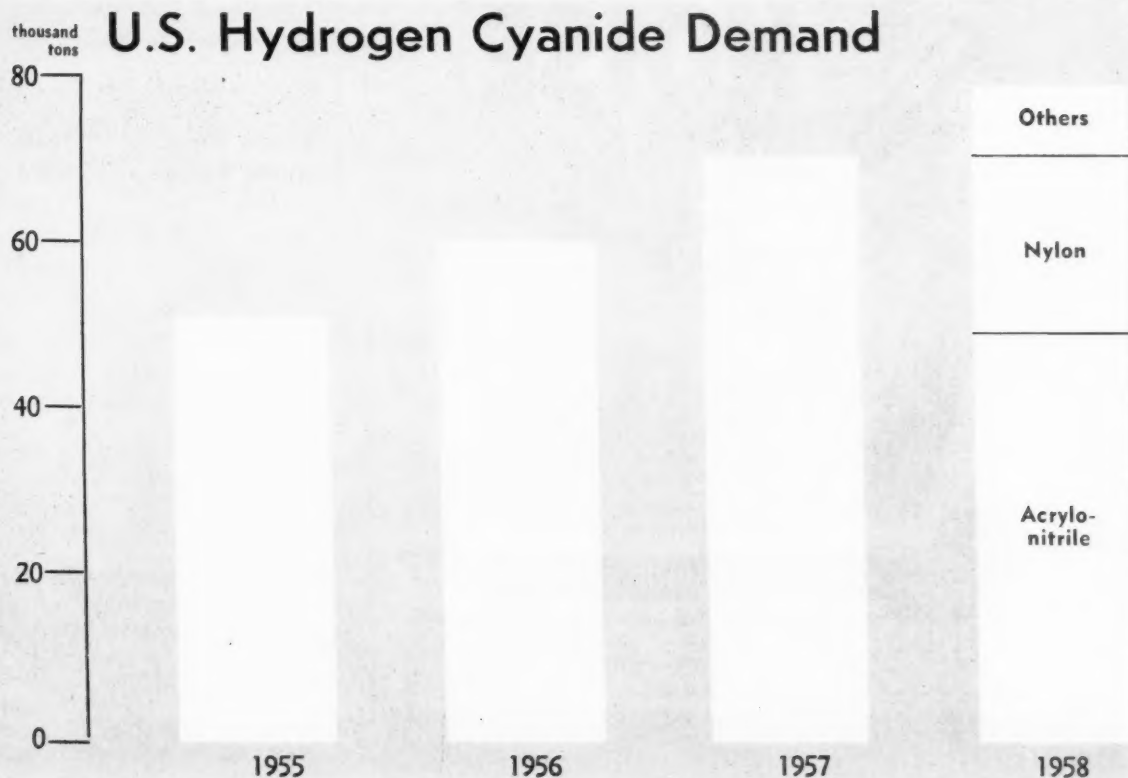
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Chemical Week • April 19, 1958



MARKETS



Hydrogen Cyanide: Future Tied to Fibers

Laid-off nylon plant workers' return last week to their jobs was good news to the producers of hydrogen cyanide as well as to the employees. For it is on the production of nylon—and, even more, acrylic—fibers that makers of hydrogen cyanide pin their hopes of setting an output record of 80,000 tons in '58.

Although cyanide's climbing production (it has gone up 51% since '55) is definitely dependent on fibers, it is an indirect dependence. Cyanide goes into the production of such intermediates as acrylonitrile and adiponitrile—and the boom of these has been directly tied to the health of the fibers industry, since acrylo is the raw material for fibers such as Orlon and Acrilan, and adipo is the starting material for nylon-66.

Illustrating the sweeping growth of these fiber intermediates: estimates are that in '58, acrylonitrile produc-

tion will hit 85-88,000 tons, requiring some 50,000 tons of cyanide. Only eight years ago, acrylo output was 7,500, taking only 4,400 tons of hydrogen cyanide.

At the same time, the acrylonitrile end-use pattern has been violently altered. Again, fibers are responsible—in '50, manufacture of nitrile rubber consumed more than 70% of U.S. acrylo production; in '58, this 70% of total production will be taken by fiber manufacture—and nitrile rubber will consume only 16%. (To keep sight of cyanide's gain from all this—in '58, about 35,000 tons of cyanide will go into the acrylo slated for fibers.)

Because of this shift in the relative importance of end-uses, market predictions for cyanide are now drawn directly from the production picture for fibers. And now that picture is most encouraging.

Fiber Future Bright: Behind the bright acrylic fiber situation are strong promotion campaigns—Carbide's for dynel, Du Pont's for Orlon, and Chemstrand's for Acrilan. Showing how they've paid off are these major plant expansions:

Du Pont's spanking-new 40-million-lbs./year Orlon plant, for example, is due onstream this year, will boost total Orlon capacity to some 120 million lbs./year.

Acrilan, which had some tough marketing problems a few years ago, has come back strongly. Public acceptance of the fiber has encouraged Chemstrand to increase its present capacity by 15 million lbs./year, which will bring total Acrilan capacity to some 45 million lbs./year by the end of '58.

Meanwhile other producers are eyeing the lush market for acrylic fibers:

- Tennessee Eastman's 12-million-

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MARKETS

Hydrogen Cyanide Used In Acrylonitrile Outlets, '58

(thousand pounds)

| | |
|----------------|-------------|
| Acrylic fibers | 35.0 |
| Nitrile Rubber | 8.0 |
| Plastics | 2.8 |
| Others | 4.2 |
| Total | 50.0 |

lbs./year Verel plant came onstream last year.

- American Cyanamid's Creslan will become a commercial reality in early '59 when the firm's 27-million-lbs./year Pensacola, Fla., plant comes into production.

- Dow's 15-million-lbs./year Zefran plant at Lee Hall, Va., will go into commercial-scale production in mid-'58.

With total acrylic fiber capacity well past the 200-million-lbs./year mark by the end of this year and the likelihood that increased public acceptance will keep fiber production near actual capacity figures, it's apparent that this outlet will continue to be the main prop for hydrogen cyanide consumption for many years.

Nitrile Rubber: Although nitrile rubber has fallen from its perch as leading outlet for acrylonitrile—and as an indirect cyanide user, it is below nylon now—it will still take an impressive 8,000 tons of cyanide this year (in 14,000 tons of acrylo). But nitrile rubber demand has only crawled upward, compared with the bounding demand for acrylic fiber.

There are now three major outlets for nitrile rubber: mechanical rubber goods, paper treatment, auto and airplane parts.

One producer of nitrile rubber predicts that the biggest area of future growth for his product is as a binder for nonwoven fabrics and in the treating of wash-and-wear clothes. Consensus is, however, that this end-use will not, in turn, boost hydrogen cyanide demand as much as the textiles will.

Use of the cyanide in acrylonitrile plastics hasn't moved as rapidly as



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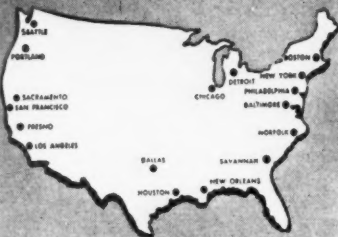


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MARKETS

had been expected, today amounts to less than 3,000 tons/year.

Nylon Squeeze: Compared with the acrylic fiber situation, the nylon phase of the synthetic fiber business is only moderately encouraging. Adiponitrile for nylon is second in the line-up of important consumers of hydrogen cyanide but not all the adipo used for nylon is derived from hydrogen cyanide. Last year, for example, only 70,000 tons of the estimated 150,000 tons of nylon was made with hydrogen cyanide-derived material—a demand for about 20,000 tons of cyanide.

At the beginning of '58, market followers of noncellulosic fibers were predicting another banner year for nylon, and '58 estimates ran as high as 170,000 tons. But now, estimates are that '58 will see production about equal to last year's—150,000 tons.

Behind the downward revisions: slump in demand for both Du Pont's and Chemstrand's nylon. As textile mills began trimming nylon inventories, orders for the fibers were curtailed. Furthermore, tire-cord demand for nylon—biggest industrial outlet for the fiber—also decreased as overall tire production slowed.

Within the past few weeks, however, there have been a few encouraging notes. Du Pont and Chemstrand early this month began recalling some of their personnel, prepared to step up production. Reason given: cloth-weaving mills and other nylon consumers have let nylon inventories drop so low they've been forced to increase their purchases to maintain present production schedules. Also, tire markets for nylon look a little better than they did a short time ago.

Other Outlets: Demand for the cyanide in other outlets—which together will account for roughly 8,000 tons this year—is difficult to pinpoint accurately. But it's certain that the bulk of this tonnage is being channeled into production of methacrylate and acrylate resins. Use of the chemical as a fumigant and pesticide is another small but steady outlet.

It's apparent that consumption of hydrogen cyanide will continue to depend primarily on the demand for acrylonitrile—acrylic fibers in particular—and on nylon. And the long-range outlook—current setbacks notwithstanding—clearly indicates a steadily increasing industrial demand for hydrogen cyanide.

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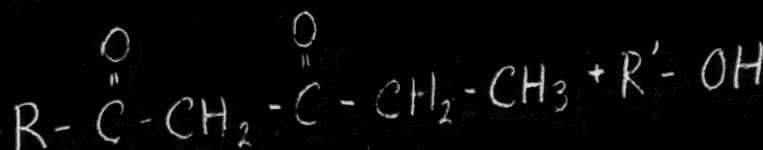
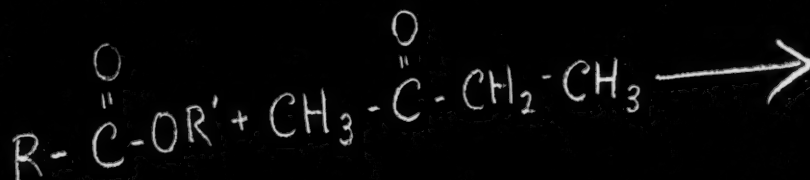
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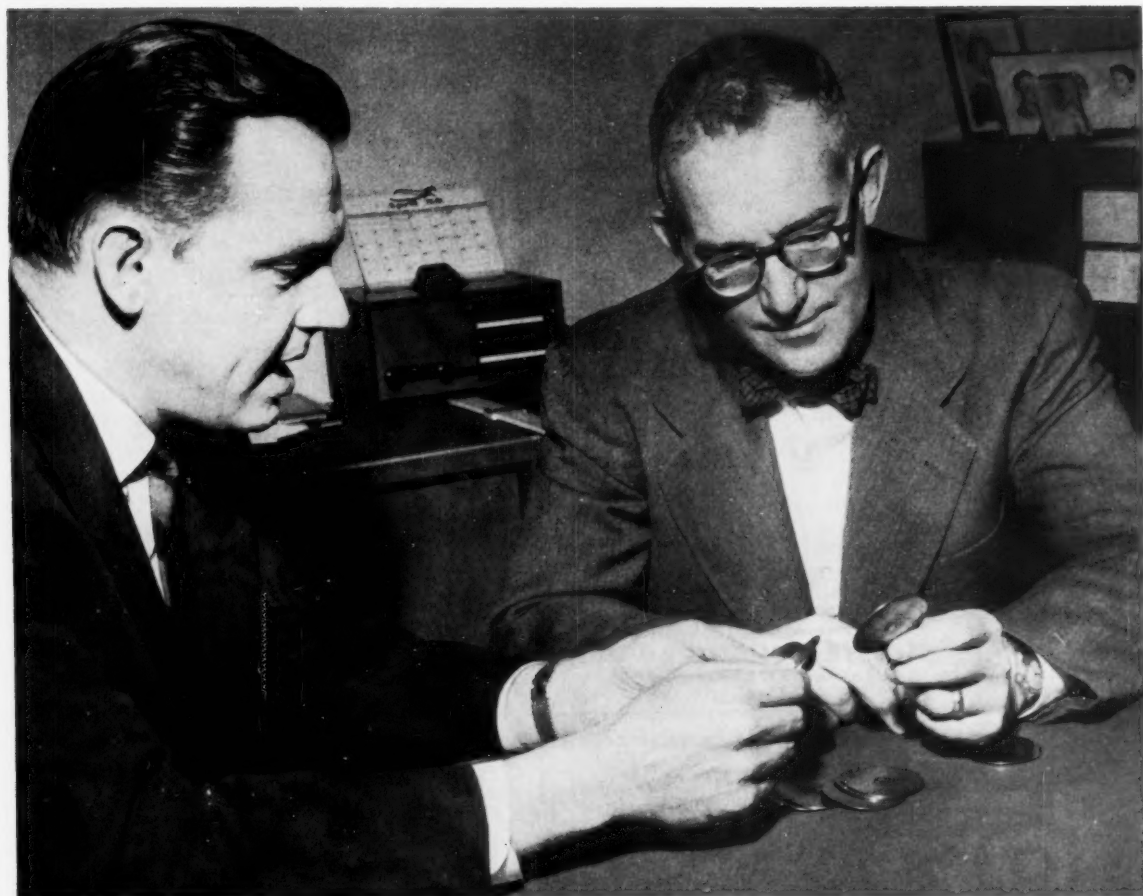
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Examining zirconium product samples, Columbia-National's Blanton and Kiddoo ponder ways of . . .

Taking Zirconium's Case to Management

The chemical process industries' equipment needs are currently under the appraising eyes of zirconium producers. Confronted with an industry capacity of 6 million lbs. and a current market pegged at only 2.5 million lbs., the producers are sparing no effort in developing outlets in the corrosion-resistant equipment and materials field.

- Columbia-National is compiling lists of metal fabricators capable of processing zirconium, plans to ask representative chemical and process management to launch comprehensive testing programs.

- Mallory-Sharon will start a broad development program within three to six months and will get lab-

oratory studies of zirconium's corrosion-resistant properties under way. Seminars for corrosion engineers are also under consideration.

- Carborundum Metals is intensifying efforts to get samples of process equipment (heat exchangers, pumps, etc.) constructed and field-tested.

The tenor of initial development work points to perhaps the biggest problem zirconium producers now face—how to obtain adequate data on the field performance of equipment constructed of zirconium. (Much data now available is based on laboratory tests of metal samples. And even some of this information is based on older-type zirconium. Present commercial zirconium has ap-

preciably lower carbon content and different corrosion properties.) Whether zirconium suppliers can get this data hinges on their ability to win the cooperation of top management in the process industries. That's the view of Columbia-National's vice-president and general manager, Gordon Kiddoo, and the sales development manager, Jack Blanton. And it's a view also shared by Carborundum Metals' sales development manager, H. A. Anderson, and Mallory-Sharon's market development manager, Leland Long.

Why Management? Zirconium equipment costs will be four or five times the cost of stainless steel items, initially at least. Because of the hefty

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SALES

price differential, says Blanton, corrosion engineers are hesitant to consider using zirconium without support of top management.

There's also a surprising unawareness of the costs of corrosion. Delivery delays stemming from corrosion-caused downtime seldom appear on a balance sheet, points out Kiddoo. Management especially needs, says Long, specific data on corrosion costs in their own plants. Moreover, reports Anderson, there's considerable confusion in the field about the properties of titanium and zirconium.



Blanton: 'Coordinated testing will speed market development.'

Without such facts and figures, the corrosion engineer can't sell his management on the value of higher-priced equipment.

Because of the large capital investment required, only management is in a position to compare the broad economic advantages of expensive equipment against the merits of other investments.

One Answer: Comprehensive test programs that would evaluate not only zirconium but also other materials (titanium, columbium, tantalum, stainless and mild steels, etc.) may be the way to win process industry management assistance, Blanton believes. That's because company officials will likely be much more receptive to a broad-base study than to a program based on a single material.

The Columbia-National program would work this way: A company would hold a general meeting of corrosion engineers from all its plants.

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SALES

Metal suppliers would present technical data at the meeting. Suggestions for tests would be solicited, and a coordinated program initiated. Suppliers would furnish test samples and facilities and personnel to interpret results. The company, in turn, would furnish suppliers with complete data on precise stream conditions. Tests on metal platelets ("coupons") would be followed by field tests on actual equipment. Prototype fabrication costs, Blanton suggests, might be shared between the supplier and the company.

If companies that conduct such studies represent various chemical process industries (paper and pulp, drugs, petrochemicals, etc.), data possibly applicable to the entire chemical process field could be obtained.

Currently, this approach is being tried at Columbia-Southern.* Some 2,500 samples of 39 different metals are under test at 160 points in five plant locations.

Development men in other zirconium companies are sympathetic to broad-base studies; but for the time being, at least, they will stress other plans. Mallory-Sharon, for example, will push its lab test-data program, follow up with a series of new technical bulletins on zirconium fabrication.

Further Hurdles: Besides the necessity of winning management co-operation, zirconium producers face other obstacles. Mill product (sheet, bar, rod, tube, etc.) inventory looms as a problem. Many fabricators are small, cannot afford to stock large inventories and, hence, are not able to fill rush orders for fabricated items. This problem, believes Long, may be circumvented by persuading large process companies to stock mill items, supply them to local fabricators when needs arise.

Overdesigning of zirconium equipment—use of too much metal—also complicates market development. Currently, there are no ASME (American Society of Mechanical Engineers) standards for zirconium equipment. To avoid difficulties with state and local government regulations, engineers overdesign apparatus and unavoidably raise the already-high cost.

A third problem stems from reluctance of some fabricators to

*Columbia-Southern and National Research Corp. jointly own Columbia-National.

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SALES

develop zirconium and titanium fabrication skills. Although many companies have the know-how, far more don't—and are showing only limited interest in acquiring new skills. Metal producers are now encouraging fabricator activity, compiling lists of those with special skills.

Big industrial markets for the newer metals are clearly not in the immediate future. But market men are confident that, once the initial problems are overcome and use data established, sales will spurt. Some predict industrial sales of several million pounds annually within three to five years. In any event, as Carborundum's Anderson puts it, "The markets are a long-haul proposition. The stakes are high and they're certainly worthwhile."

Nitrates at Baltimore?

Baltimore is under consideration this week as a new East Coast shipping point for ammonium nitrate.

Pennsylvania Railroad officials, at a recent meeting of the Baltimore Port Security Council, suggested construction of a special pier or explosives anchorage. The investment, railroad spokesmen say, would prove "well worth the money" if sufficient quantities of fertilizer-form ammonium nitrate could be moved from the Midwest through Baltimore to export markets.

Most U. S. ammonium nitrate is now exported through Louisiana ports and Artificial Island in Delaware Bay. Baltimore facilities would provide a second East Coast shipping point. A *CW* spot-check of ammonium nitrate exporters uncovered definite interest in the Pennsy's proposal. Some, however, doubted that Baltimore shipment would prove economically feasible. Much would depend upon the rates offered by the rail lines and handling charges at the port.

Full exploration of the Baltimore project still lies ahead. Discussions of the proposal were sidetracked at the council meeting when it was reported that one shipment of ammonium nitrate had already been moved through the port—without permission from federal, state or local authorities. Beyond discussing aspects of the report, the council devoted no more time to planning port facilities for ammonium nitrate.

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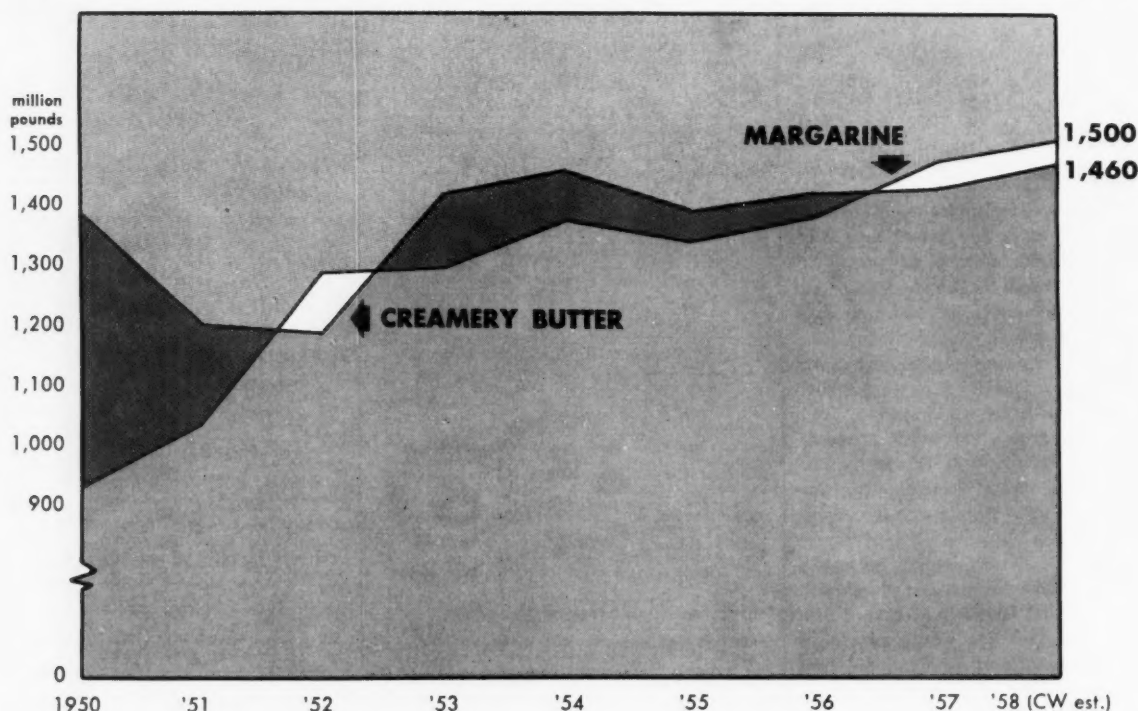
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CHARTING BUSINESS

April 19, 1958

Margarine Output Outpaces Creamery Butter



Additive Makers Fatten on Oleo Increases

Latest market forecasts put 1958's margarine output at a record high—1.5 billion lbs., a 35% increase over the '50 market of 0.9 billion lbs. It also means a record market for additive chemicals. This year, the following will be used in making margarine:

- Vitamins A and D, 24 trillion units.
- Mono- and diglycerides, 3 million lbs.
- Salt, 37.5 million lbs.
- Flavor and coloring agents, 300,000 lbs.
- Sodium benzoate, 1.05 million lbs.
- Lecithin, 2.5 million lbs.

In setting the new mark, margarine production will,

as it did last year, likely edge creamery butter production, which is expected to hit about 1.46 billion lbs. Butter output has increased only 3% since '50.

There's little wonder that the farmer may be a trifle discontented these days. But, as the National Assn. of Margarine Producers points out, production of their bread spread hasn't cut into over-all farm income (although it may have limited the dairyman's take). Reason: this year, margarine production will use more than 1.2 billion lbs. of edible vegetable and animal fats and oils. This represents a \$125-million market for the agricultural industry.

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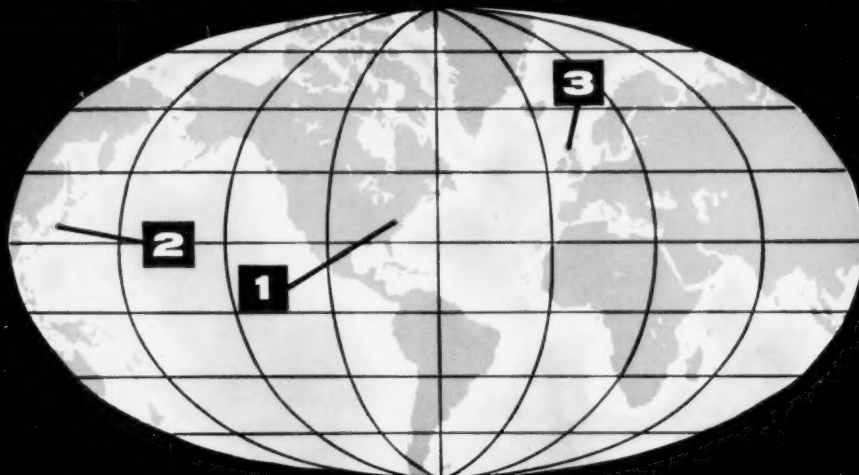
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SD

Designs Third Cumene Plant

**1**

Barrett Division of Allied Chemical & Dye Corp.

Located in Frankford, Pennsylvania,
this plant has been in operation since 1954.

2

Mitsui Petrochemical Industries, Ltd.

This cumene plant, part of a
\$30,000,000 petrochemical project, has just
been completed at Iwakuni City, Japan.

3

British Hydrocarbon Chemicals, Ltd.

Plant design is underway for this latest cumene plant
which will be built in Grangemouth, Scotland. It is scheduled
to go on stream about the middle of 1959.

High-purity, high-yield cumene for phenol

SD is proud to have been selected to design British Hydrocarbon Chemicals' new cumene plant at Grangemouth. The process, originally developed by SD, has been licensed to BHC by Mid-Century Corporation, a subsidiary of Standard Oil Company (Indiana), which acquired exclusive world-wide rights to the process last year. • BHC, jointly owned by The Distillers Company Ltd. and British

Petroleum Company Ltd., will make phenol from cumene at the same location. The important new phenol-from-cumene process was co-developed originally by The Distillers Company and has been licensed extensively abroad. However, this will be the first plant built by The Distillers Company itself. • Your inquiry on this or any other organic chemical project is invited.



Scientific Design Company, Inc.

CHEMICAL PROCESSES • PLANT DESIGN • CONSTRUCTION

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